

Five pages 59-60 for State Seal

SIXTH BIENNIAL REPORT

OF

The Department of Conservation
and Development

OF THE

STATE OF NORTH CAROLINA



BIENNIUM ENDING JUNE 30, 1936

SIXTH BIENNIAL REPORT

OF

THE DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

OF THE

STATE OF NORTH CAROLINA

FOR THE BIENNIUM ENDING JUNE 30, 1936

BOARD OF CONSERVATION AND DEVELOPMENT

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R. BRUCE ETHERIDGE, Director.....Raleigh

LETTER OF TRANSMITTAL

Raleigh, N. C.
October 15, 1936.

To His Excellency, HON. J. C. B. EHRLINGHAUS,
Governor of North Carolina.

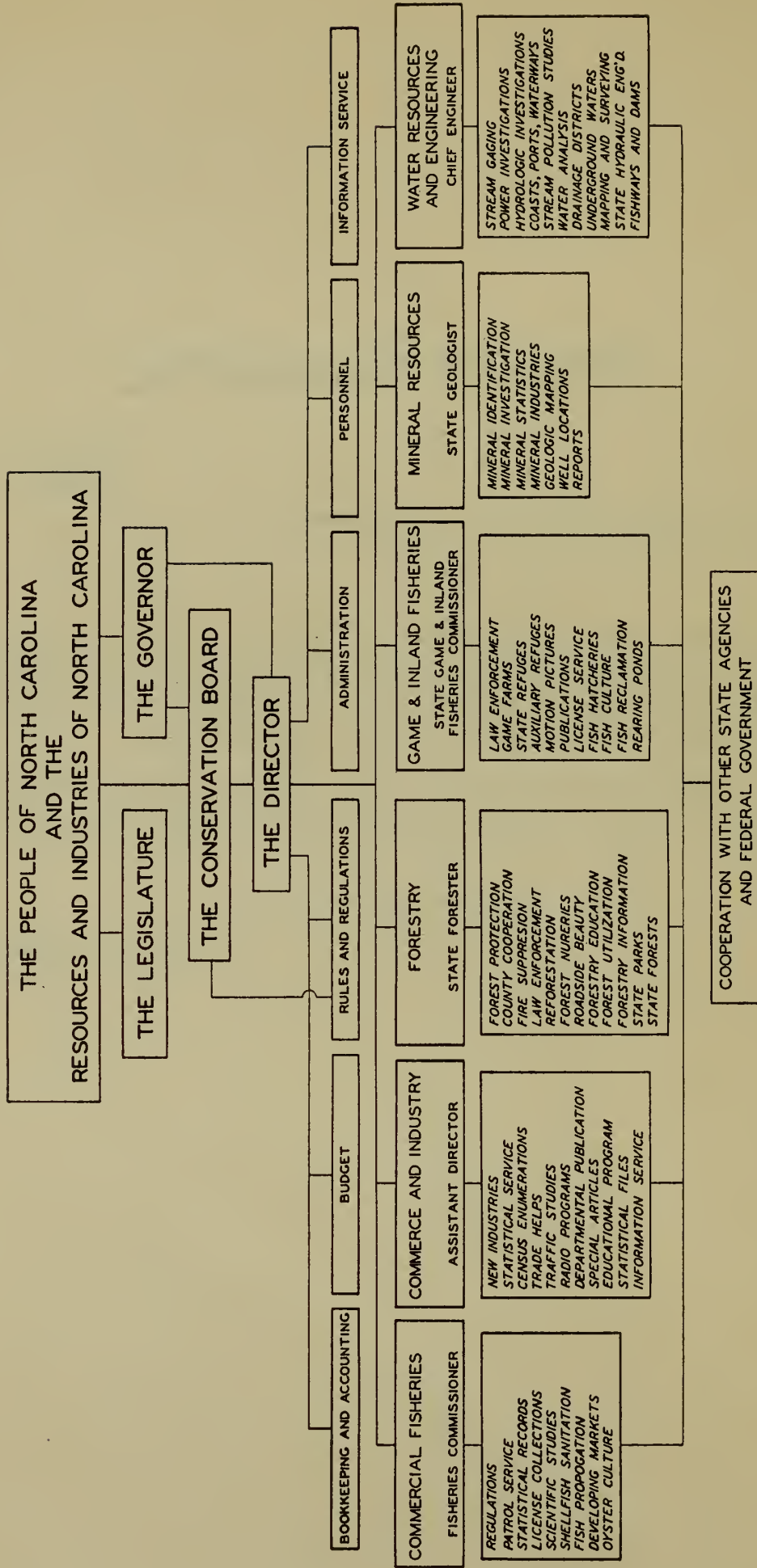
Sir:

In accordance with Section 11, Chapter 122, Public Laws of 1925, and by direction of the Board of Conservation and Development, I have the pleasure of submitting herewith the Sixth Report of the Department of Conservation and Development for the biennium ending June 30, 1936.

There are shown in this report a review of the activities of the Department during the last two-year period and a financial statement for the biennium.

Respectfully submitted,

R. BRUCE ETHERIDGE,
Director.



DEPARTMENT PERSONNEL AND PRINCIPAL OFFICERS

ADMINISTRATIVE

R. BRUCE ETHERIDGE, *Director*
PAUL KELLY, *Assistant Director*
R. N. SANFORD, *Auditor*
MRS. ETOYAL P. HOBBIE, *Fiscal Clerk*
GLADYS PRITCHETT, *Purchasing Agent*
FRANCES POPE, *Senior Stenographer*

DIVISION OF COMMERCIAL FISHERIES

CAPT. JOHN A. NELSON, *Commissioner*
N. R. WEBB, *Fiscal Clerk*
MARY E. WILLIS, *Stenographer*
A. B. FREEMAN, *Assistant Sanitary Engineer*

Assistant Commissioner
THOMAS BASNIGHT, *Maneto*

DIVISION OF COMMERCE AND INDUSTRY

PAUL KELLY, *Chief*

DIVISION OF FORESTRY

J. S. HOLMES, *State Forester*
W. C. McCORMICK, *Assistant State Forester*
W. K. BEICHLER, *Associate Forester*
GRACE WHITE, *Accounting Clerk-Stenographer*
MABEL DUKE, *Senior Stenographer*
SUSAN MARSHALL, *Stenographer*

District Foresters:

JOHN D. FINDLAY, Rocky Mount	PAUL W. TILLMAN, Rockingham
J. R. SPRATT, Lenoir	J. M. STINGLEY, New Bern
J. B. LATTAY, Fayetteville, N. C.	

DIVISION OF GAME AND INLAND FISHERIES

J. D. CHALK, *Commissioner*
E. B. KUGLER, *Chief License Clerk*
MRS. ALICE W. AUSTELL, *Senior Stenographer*
FRANCES PAPPENDICK, *Stenographer*

Assistant State Wardens:

J. A. BRADSHAW, Asheville	LARRY WARRINGTON, New Bern
FRED D. WILLIAMS, Fayetteville	W. C. LISK, Richfield
RUPERT E. WEST, Moyock	R. GRADY FARTHING, Boone

CHAS. W. BURNHAM, *Supervising Fish Culturist*, Fayetteville

Fish Hatchery Superintendents:

Morrison Hatchery, LEO F. REIGER, Balsam
Frank Stedman Hatchery, W. T. PARKER, Fayetteville
"Pete" Murphy Hatchery, FRANK S. DYSART, Marion
Boone Hatchery, C. E. SMATHERS, Boone
Roaring Gap Hatchery, WM. R. SKAGGS, Roaring Gap

DIVISION OF MINERAL RESOURCES

H. J. BRYSON, *State Geologist*
MARJORIE SMITH, *Stenographer*

DIVISION OF WATER RESOURCES AND ENGINEERING

T. S. JOHNSON, *Chief Engineer*
W. H. RILEY, *Assistant Engineer*
CARROLL L. MANN, JR., *Assistant Engineer*
F. E. DAY, *Assistant Engineer*, Asheville
DOROTHY LINDSEY, *Stenographer*

REPORT OF DIRECTOR

The two years covered by this report constitute a period of great importance to the State's conservation program. Whereas, the preceding biennium was marked by drastic retrenchments in the Department's activities, improved economic conditions, more adequate fiscal provisions, and extensive coöperation from Federal emergency agencies have altered the situation.

Plans carried out during the biennium did not by any means all originate with this administration; but they have followed, to a considerable extent, carefully conceived policies of our predecessors who labored faithfully to guide public thought and activities toward a realization of the purposes for which the Department was created. Their fundamental work had charted the course toward progress.

As a result of the foregoing reasons, much of a constructive nature has been accomplished during the last biennium; and even more important, the attitude of the public toward the natural resources of the State is changing materially. There is a growing general impression that all our renewable resources should be so handled as to assure the maximum future returns and that those of exhaustible nature should be utilized to the best possible advantage. These gains must be preserved and new objectives sought in making the State a more prosperous and pleasant place in which to live.

BOARD OF CONSERVATION AND DEVELOPMENT

To a considerable extent, credit for progress in the program of the Department is due to the wise direction and untiring efforts of the Board of Conservation and Development. Members of the group, headed by Gov. J. C. B. Ehringhaus, as Chairman ex-officio, have given wise direction to its policies and have devoted liberally of their time to the solution of its problems. The Director has at all times had the benefit of their helpful counsel and active assistance.

Although serving without compensation, Board members have exhibited at all times a keen interest in the affairs of the Department and the general welfare of the State. They have not only established policies but have taken the time from their own activities to assist in the execution of their proposals. Special mention should be made of the deep interest of Governor Ehringhaus in the natural resources of North Carolina and his concern that they be utilized for the best interests of the public. Only with his full coöperation has the Department been able to carry out many important projects.

LEGISLATION

One of the most serious handicaps to the conservation program at the beginning of the biennium was the severe curtailment in appropriations. This support of the Department was cut probably more drastically than for any State agency in 1933 when an annual appropriation of only \$29,645, compared with \$80,800 for the previous year, was provided.

The General Assembly of 1935, however, met the challenging needs of the program by appropriating \$69,665.95 for fiscal year, 1935-36. As a result, the Department has been able to function more effectively and meet more of the demands for service.

From the standpoint of constructive conservation legislation, the 1935 General Assembly probably made the greatest contribution since the Department was created. Some of the more important conservation measures passed by that body and their designation in Public Laws of 1935 include:

Chapter 486—Reënactment and revision of the State Game Law, now generally acknowledged as one of the outstanding statutes of its kind in the country.

Chapter 35—Reinvestment of authority to regulate fisheries of the State in Board of Conservation and Development.

Chapter 197—Authorizing a program to mark points of outstanding historical interest in North Carolina in coöperation with the State Highway and Public Works Commission and the State Historical Commission.

Chapter 226—Empowering Department of Conservation and Development to accept land from the Resettlement Administration for State Parks, Forests, Game Refuges and Public Shooting grounds for administration.

Chapter 173—An act directing the withholding of State-owned vacant lands from sale where found suitable for State Parks, Forests, etc.

Chapter 332—Empowering State to turn over to Federal government lands in vicinity of Cape Hatteras for a National Park should such a reservation be established.

Chapter 430—Authorizing State Park system, enabling the Department of Conservation and Development to acquire suitable areas for this purpose "by lease, purchase or otherwise."

Chapter 178—An act looking toward State-wide forest fire protection with coöperation between the State and Counties where needed.

HISTORICAL MARKERS

Various organizations and individuals for a number of years have urged the marking of places of significance in the history of North Carolina in a manner similar to the program carried on in Virginia and other states.

The Board of Conservaton and Development in July, 1934, adopted this project as one of its major objectives for the biennium and enlisted the coöperation of the State Historical Commission and the State Highway and Public Works Commission in the undertaking. One of the first steps was the appointment of a committee of outstanding historians representing the so-called "Big Five" among the men's colleges of the State—the University of North Carolina, Duke University, State College, Wake Forest College, and Davidson College, and the Secretary of the State Historical Commission.

A bill authorizing the program was introduced in the General Assembly of 1935. With a committee amendment declaring the erection of historical markers a valid expenditure, to a limit of \$5,000 annually, of highway maintenance funds, the bill was passed. The Highway and Public Works Commission subsequently set aside \$5,000 annually for the biennium of 1935-37 for the marker program.

In a division of the marker work, the committee of historians, headed by

the Secretary of the State Historical Commission, was placed in charge of the selection of spots to be marked and the preparation of the inscriptions; the Department of Conservation and Development undertook to look after the casting of the plates, definitely locating the markers, and other business details; and the Highway and Public Works Commission agreed to erect the markers. Each of the coöperating agencies has carried out its duties and the arrangement has worked well.

The committee selected a design 42 inches wide by 36 inches deep, finished at the top in a scroll effect with a facsimile of the State seal imbedded approximately midway of the top center. Since aluminum is a North Carolina product, it was decided to use this metal in casting the plates. Under the contract, let on competitive bid, the first 50 markers cost \$39 each delivered in Raleigh and an option was taken on an additional hundred at \$38 each.

Up to the end of the current biennium, 46 of the markers had been completed and most of these erected. Additional legends are being furnished and it is probable that 150 or more may be in place by the end of the two-year period. Following are the key numbers, titles and locations of the first group completed:

A-1	St. Paul's Church.....	Chowan County
A-2	Indian Woods.....	Bertie County
A-3	George Durant.....	Perquimans County
A-4	Joseph Hewes.....	Chowan County
A-5	James Iredell.....	Chowan County
B-1	First English Colonies.....	Dare County
C-1	Stanly Home.....	Craven County
C-2	Tryon's Palace.....	Craven County
C-3	First Printing Press.....	Craven County
C-4	Ocracoke Inlet.....	Carteret County
C-5	Abner Nash.....	Craven County
C-7	Richard Dobbs Speight.....	Craven County
C-8	Spanish Attack.....	Carteret County
D-1	Cornelius Harnett.....	New Hanover County
D-2	Old Courthouse.....	New Hanover County
D-3	Orton.....	Brunswick County
D-4	Stamp Act.....	Brunswick County
D-5	St. James Church.....	New Hanover County
D-6	Moore's Creek Bridge.....	Pender County
D-7	Samuel Ashe.....	Pender County
E-1	Green Hill Place.....	Franklin County
E-2	Nathaniel Macon.....	Warren County
E-3	Independence.....	Halifax County
E-4	William R. Davie.....	Halifax County
E-5	Annie C. Lee.....	Warren County
G-1	John Penn.....	Granville County
G-2	Alamance Battleground.....	Alamance County
H-1	Battle of Bentonville.....	Johnson County
H-2	Joel Lane House.....	Wake County
H-3	Isaac Hunter's Tavern.....	Wake County

H-4	State Capitol.....	Wake County
H-5	Christ Church Rectory.....	Wake County
H-7	Dix Hill.....	Wake County
I-1	Old Bluff Church.....	Cumberland County
I-2	U. S. Arsenal.....	Cumberland County
I-3	John Charles McNeill.....	Scotland County
I-4	James C. Dobbin.....	Cumberland County
J-3	Guilford Courthouse.....	Guilford County
J-4	John Motley Morehead.....	Guilford County
J-5	Calvin H. Wiley.....	Guilford County
J-1	"O. Henry".....	Guilford County
O-1	Kings Mountain Battleground.....	Cleveland County
O-2	Sidney Lanier.....	Polk County
P-1	Calvary Church, Episcopal.....	Henderson County
P-2	Zebulon B. Vance.....	Buncombe County
P-3	Riverside Cemetery.....	Buncombe County

Full acknowledgement should be made of the unselfish service of the committee of historians. These men have served purely through interest in the program without compensation. While the major burden of research, involving many perplexing details, has been borne by the State Historical Commission, the committee has reviewed and approved the legends for each individual marker. The committee has been assisted by an advisory group representing the various patriotic groups in the State and by many public-spirited citizens who have taken an active interest in the program.

STATE PARKS

While this subject will be covered in more detail in the report of the Division of Forestry, some mention of the progress should be made in the Director's report.

The State finds a culmination during the past biennium of plans of many years' standing to provide the people with a system of recreational areas and to preserve places of outstanding scenic value.

Three new State Parks, all coming as gifts, have been acquired during the biennium. These new areas are Hanging Rock in Stokes County, Morrow Mountain in Stanly County, and Cape Hatteras (Phipps Memorial Park) in Dare County. There were previously three State Parks—Mount Mitchell in Yancey County, Rendezvous Mountain in Wilkes County, and Fort Macon in Carteret County.

Some development has been carried out on each of these areas, largely as the result of means provided by various emergency Federal organizations. A description of the improvements and more detailed information on these areas will be found elsewhere in this report.

COMMERCIAL FISHERIES

Conservation officials of North Carolina have over a period of years sought a remedy for depressed commercial fishery market conditions. During the biennium of 1930-32, a meeting of dealers was called and an organi-

zation formed. This group worked faithfully to help solve the problems of the industry. The fishermen were also advised to organize in order to seek a coöperative solution of their problems.

Faced by diminishing returns for their products while the price of other commodities was rising, the economic condition of the fishermen grew progressively worse early in the current biennium. Eager to assist in any effort which offered opportunity to boost the income of the commercial fishermen, the Department encouraged the establishment of an NRA code for the industry, but this plan did not get a start before the act establishing the NRA was declared unconstitutional.

The Department next proposed setting up definite grades and standards for seafoods as had been done for various agricultural products. It was hoped by this plan to establish more uniform products and increase the consumption of seafoods and the return to the fishermen. It was found impossible, after a thorough investigation of the requirements, to proceed with this project because of the lack of funds.

Following the storms in the fall of 1933 and the spring of 1934, the needs of the fishermen in the form of new equipment to replace losses were presented to the relief agencies and as a result a large number of nets was distributed.

Next, full support was given to a series of bills introduced in Congress for the relief of the fishermen. On February 27, 1934, the Director appeared before the House of Representatives Committee on Merchant Marine, Radio, and Fisheries to urge the extension of relief measures applied to agriculture and the manufacturing industries to the fisheries, along with other bills intended to assist the fishermen. At the hearing he stressed the need of "marketing associations."

With the full coöperation of Gov. J. C. B. Ehringhaus, who has continuously manifested an interest in the welfare of the commercial fishermen and the industry, the Department proposed the establishment of an organization to take advantage of facilities of the Division of Self-Help Coöperatives of the Federal Emergency Relief Administration.

At the request of Gov. Ehringhaus and the Director, a study to determine the need and prospects for such an organization in North Carolina was authorized by Mrs. Thomas O'Berry, Emergency Relief Administrator. As a result of this survey, the N. C. Fisheries, Inc., a coöperative for the commercial fishermen, was organized.

Facilities for marketing and storing fish provided for the coöperative, include a main plant at Morehead City with a daily freezing capacity of more than 10,000 pounds of fish and storage space for 800,000 pounds. Branch plants were established at Southport, Manteo, and Belhaven. Operation of the plants at Morehead City, Southport, and Belhaven began October 7, 1935; and the Manteo plant opened in November. Total cost of all the plants, according to the ERA, was approximately \$132,605.

While the Department has no hand in the management of the organization, it is hoped that the entire industry may profit from new forms in which seafoods are offered to the consumer, the large storage capacity which makes it possible to absorb a considerable part of seasonal surpluses, and expanded markets for fishery products.

PARK-TO-PARK HIGHWAY

This Department coöperated with the State Highway and Public Works Commission and other agencies in presenting North Carolina's claims for this great scenic drive which will connect the Great Smoky Mountains National Park with the Shenandoah National Park in Virginia.

The Vice-chairman of the Board of Conservation and Development, J. Q. Gilkey, of Marion, served as chairman of the special committee appointed by Gov. Ehringhaus, to represent the State's interests in the parkway. That this committee and other agencies were successful in their endeavors is generally known.

This scenic road will be one of the outstanding drives in America, with the climax being reached in the Great Smoky Mountains National Park in North Carolina and Tennessee. The drive will extend along the crest of the Blue Ridge Mountains in Virginia and North Carolina, running for some 250 miles through this State where its elevation will be nowhere less than 2,000 feet, with a maximum height of some 6,000 feet.

SURVEY OF RESOURCES AND INDUSTRIES

At the request of Gov. J. C. B. Ehringhaus, the Department has undertaken to inventory the resources and industries of North Carolina with the results of the study to be issued in printed form by the end of the current calendar year. The Department hopes this report will be the first step toward a continuous study of this nature, brought up to date at regular intervals.

The project is now being organized, and it is expected that the information gathered for the report will serve as a guide for future development and will promote a fuller utilization of the industrial, agricultural, and natural resources of the State.

Active direction of the study has been placed under the direction of T. S. Johnson, of this Department, who is also serving as consultant to the State Planning Board. Mr. Johnson will be assisted by the Division of Commerce and Industry.

SAND FIXATION PROGRAM

Repeated studies of the coastal section of North Carolina have brought opinions from various engineers that steady erosion caused by the wind and tides threatens the future existence of that narrow strip of land known as "the Banks" which protect the mainland of the State against the forces of the elements.

The Department, in an effort to save this protecting reef, sponsored a WPA project of "sand fixation" on "the Banks." Largely as a result of the interest taken in the proposal by Rep. Lindsey Warren, of the First Congressional District, a comprehensive program of this nature was approved by the Works Progress Administration. Five camps of transient workers, extending along approximately 100 miles of the coast, were established by the end of this report period. These camps had a total of 591 men, including

the administrative force. The location of the units and the number of men at each are as follows: Manteo, 187; Duck, 104; Hatteras, 112; Rodanthe, 127; and Ocracoke, 61.

The National Park Service is scheduled to assume co-sponsorship of the project, with the Department of Conservation and Development, on July 1, 1936. This coöperative sponsorship is considered a fortunate move for the Department because of the wider facilities of the Federal agency for planning and supervision.

First of the sand fixation measures is the construction of brush and wood fences to arrest the movement of sands drifting before the winds. The second phase of the program contemplates extensive grass plantings to form a protecting mat over the shifting sands. The reëstablishment of forest growth on a considerable part of this area is contemplated as the final step in the undertaking.

An account of ECW sand fixation operations will be found in the Division of Forestry report.

OYSTER PLANTING

Planting of oysters, started as a job-creating relief measure under the old Civil Works Administration in the previous biennium, was continued during the current two-year period by the Emergency Relief Administration and the Works Progress Administration under the sponsorship of the Department of Conservation and Development.

A total of 774,038 bushels of oysters and shells had been planted at the close of last biennium and 1,358,468 bushels were added during 1934-36. The shells and oysters were placed on sound bottoms in Brunswick, New Hanover, Pender, Onslow, Carteret, Pamlico, Hyde and Dare Counties at an average cost of 9 cents per bushel.

Many oyster bottoms of North Carolina have been effectively rehabilitated by this new stock. While the project has provided work for hundreds of men, it also constitutes a sound investment for the future. The planted oysters are expected to multiply in volume and provide future crops of shellfish, and thereby to furnish more work and income for the fishermen.

PROPOSED EASTERN NATIONAL PARK

The Department has continued to urge the establishment of a new National Park along the picturesque "Banks" of North Carolina.

Elaborate briefs supporting the project have been filed with the National Park Service; and definite improvement and development programs looking toward this goal have been submitted to the various work relief agencies.

Establishment of Cape Hatteras State Park and the extensive sand fixation programs are steps toward the major development which, it is hoped, will eventually extend 75 or more miles along "the Banks" and possibly incorporate other nearby reservations, including the Wright Memorial on Kill Devil Hill and Fort Raleigh on Roanoke Island.

RECOMMENDATIONS

Two general recommendations, both matters of prime importance to the State, are submitted for consideration.

First, the opportune time has arrived for the State of North Carolina to launch a program to attract tourists and promote further utilization of her natural resources in manufacturing processes.

With economic conditions rapidly improving, the number of persons seeking recreation, new scenic areas, and historical interest is increasing. Those familiar with the attractions of our State need not be convinced that the vacationist finds virtually all of his demands met in North Carolina. The tourist industry is becoming more highly competitive and the States that would profit more fully from their natural endowments must seek aggressively to bring new visitors within their borders.

North Carolina is capitalizing only to a small extent on her natural resources compared with some of her sister States that have made known their attractions through the various mediums of advertising. The expenditure of a modest fund for this purpose will be a sound investment which should return dividends a hundredfold or more.

Improving economic conditions signify a greater industrial activity. North Carolina, although already a leader in her section of the country in industrial development, offers wide opportunities for expansion of manufacturing. Further utilization of the State's natural resources in the production of finished articles means more jobs, larger payrolls, and greatly increased wealth for her citizens.

It is recommended that funds be provided for advertising the tourist attractions and industrial opportunities of the State.

Second, the historical marker program has been accorded the approval and support of the public. It has quickened the interest of the people of North Carolina in the history of the State, and there is every indication that the project will prove a sound investment from the standpoint of increased State pride and in attracting visitors.

With the fund of \$10,000 provided over a period of two years, only a comparatively small number of outstanding points of historical interest have been marked, and others equally deserving should be given similar attention. Provision of at least an amount equal to that made available during the past biennium is urged for the next fiscal period.

APPROPRIATION DIVISIONS

STATEMENT OF RECEIPTS AND DISBURSEMENTS
Biennium 1934-1936

	1934-35	1935-36
I. ADMINISTRATION:		
<i>Board of Conservation and Development:</i>		
Attending Meetings.....	\$ 319.26	\$ 322.14
<i>Director's Office:</i>		
Salary, Director.....	4,000.00	4,800.00
Salaries, Staff.....	3,300.00	4,140.00
Wages, Janitor-Messenger.....	524.87	699.00
Office Supplies.....	219.32	260.25
Stationery and Sundries.....	22.25	188.72
Postage and Box Rent.....	547.21	504.50
Telephone and Telegrams.....	200.24	151.52
Express, Freight and Drayage.....	60.90	180.21
Field Travel.....	353.86	767.55
Printing Forms.....	75.98	226.25
Printing Publications.....	401.37	
Equipment Repairs.....	35.66	14.65
Subscriptions and Dues.....	65.00	55.00
Fair Exhibits.....	152.48	
Office Equipment.....	151.42	358.15
Total Expenditures.....	\$10,429.82	\$12,667.94
Less Receipts:		
Sale of Publications.....	20.61	34.85
State Appropriation.....	\$10,409.21	\$12,633.09
II. WATER RESOURCES:		
Salary, Chief Engineer.....	\$ 1,654.17	\$ 1,080.00
Salaries, Staff.....	2,126.00	5,862.00
Salaries, Extra.....		919.90
Office Supplies.....	65.72	75.27
Engineering Supplies.....	51.38	211.83
Materials.....	29.69	19.06
Postage and Box Rent.....	42.62	77.00
Telephone and Telegrams.....	162.72	70.10
Express, Freight and Drayage.....	4.32	1.86
Field Travel.....	834.23	1,305.98
Printing Forms.....	6.45	19.45
Duplicating Service.....	60.69	70.36
Motor Vehicle Operation.....	382.65	639.68
Repairs, Equipment.....	18.30	17.41
Coöperation with U. S. Geological Survey.....	3,031.31	3,109.92
General Expense.....	84.08	
Mechanical Service.....	13.50	
Office Equipment.....		25.83
Engineering Equipment.....	105.45	
Purchase of Motor Vehicles.....		1,138.37
Total Expenditures.....	\$8,673.28	\$14,644.02
Less Receipts:		
Private Coöperation.....	1,022.41	1,195.12
State Appropriation.....	\$ 7,650.87	\$13,448.90

STATEMENT OF RECEIPTS AND DISBURSEMENTS—*Continued*
Biennium 1934-1936

	1934-35	1935-36
III. MINERAL RESOURCES:		
Salary, State Geologist.....	\$ 2,250.00	\$ 2,950.00
Salaries, Staff.....	1,050.00	2,340.00
Office Supplies.....	32.53	34.37
Postage.....	10.00	86.69
Telephone and Telegrams.....	25.34	-----
Field Travel.....	1,095.13	476.20
Motor Vehicle Operation.....	-----	541.44
Printing Publications.....	-----	436.36
Office Equipment.....	-----	76.95
Purchase of Automobiles.....	-----	623.20
State Appropriation.....	\$ 4,463.00	\$ 7,565.21
IV. FOREST FIRE PREVENTION:		
<i>Administration:</i>		
Salary, Chief of Forest Fire Control.....	\$ 3,000.00	\$ 3,600.00
Salaries, Staff.....	2,616.00	3,570.00
Office Supplies.....	162.39	222.44
Postage.....	357.00	424.00
Telephone and Telegrams.....	136.80	71.86
Express, Freight and Drayage.....	30.34	31.89
Field Travel.....	616.76	878.70
Printing Forms.....	425.59	500.84
Motor Vehicle Operation.....	759.68	463.64
Equipment Repairs.....	25.82	47.10
Workmen's Compensation.....	94.71	51.00
Special Equipment.....	302.78	-----
Office Equipment.....	202.23	151.00
Miscellaneous Equipment.....	93.60	143.55
Purchase of Automobiles.....	1,215.20	2,697.38
Alterations, Office.....	106.30	-----
	\$10,145.20	\$12,853.40
<i>Coöperative Projects:</i>		
Salaries and Wages, Wardens.....	\$37,732.28	\$66,820.54
Travel Expenses, Wardens.....	1,616.06	3,070.03
Fire Control Equipment.....	16,706.99	14,585.91
Equipment Repairs.....	911.40	1,994.71
Telephone Lines.....	683.27	1,539.54
Lookout Towers.....	452.81	1,123.90
Buildings.....	-----	132.14
Wages, Fire Fighters.....	8,533.05	12,103.61
	\$66,635.86	\$101,370.38
<i>District No. 1:</i>		
Salary, District Forester.....	\$ 1,680.00	\$ 2,640.00
Salaries, Staff.....	927.00	2,370.00
Postage.....	75.00	75.00
Telephone and Telegrams.....	114.17	108.40
Field Travel.....	263.95	637.04
Motor Vehicle Operation.....	432.75	670.87
Rents.....	120.00	120.00
	\$ 3,612.87	\$ 6,621.31

STATEMENT OF RECEIPTS AND DISBURSEMENTS—*Continued*
Biennium 1934-1936

	1934-35	1935-36
IV. FOREST FIRE PREVENTION— <i>Continued</i>		
<i>District No. 2:</i>		
Salary, District Forester.....	\$ -----	\$ 1,500.00
Salaries, Staff.....	1,666.66	2,610.00
Postage.....	44.00	61.00
Telephone and Telegrams.....	91.57	100.92
Field Travel.....	133.22	449.77
Motor Vehicle Operation.....	420.70	435.31
Electric Current.....	8.40	-----
Rents.....	120.00	120.00
	\$ 2,484.55	\$ 5,277.00
<i>District No. 3:</i>		
Salary, District Forester.....	\$ 1,225.00	\$ 1,800.00
Salaries, Staff.....	2,200.00	2,460.00
Postage.....	89.00	67.00
Telephone and Telegrams.....	105.51	78.43
Field Travel.....	427.20	450.88
Motor Vehicle Operation.....	781.40	724.31
Rents.....	265.50	-----
Buildings.....	-----	206.11
	\$ 5,093.61	\$ 5,786.73
<i>District No. 4:</i>		
Salary, District Forester.....	\$ -----	\$ 2,107.50
Salaries, Staff.....	1,800.00	2,490.00
Postage.....	45.00	65.85
Telephone and Telegrams.....	103.63	72.15
Field Travel.....	381.70	334.80
Motor Vehicle Operation.....	600.44	717.18
Rents.....	60.00	45.00
	\$ 2,990.77	\$ 5,832.48
<i>District No. 5:</i>		
Salary, District Forester.....	\$ 1,375.00	\$ 1,800.00
Salaries, Staff.....	2,008.00	2,280.00
Postage.....	48.66	43.55
Telephone and Telegrams.....	65.00	122.65
Field Travel.....	343.81	526.83
Motor Vehicle Operation.....	788.58	821.02
Electric Current.....	1.50	3.06
Rents.....	27.00	70.00
	\$ 4,657.55	\$ 5,667.11
<i>District No. 6:</i>		
Salary, District Forester.....	\$ -----	\$ 1,785.00
Salaries, Staff.....	1,428.26	2,340.00
Postage.....	34.72	72.05
Telephone and Telegrams.....	18.54	95.08
Field Travel.....	241.30	859.48
Motor Vehicle Operation.....	446.70	1,188.32
Rents.....	55.00	218.00
	\$ 2,224.52	\$ 6,557.93
Total Expenditures.....	\$97,844.93	\$149,966.34

STATEMENT OF RECEIPTS AND DISBURSEMENTS—*Continued*
Biennium 1934-1936

	1934-35	1935-36
IV. FOREST FIRE PREVENTION—<i>Continued</i>		
Less Receipts:		
Federal Coöperation.....	\$46,225.34	\$55,257.12
County Coöperation.....	30,287.67	37,794.24
Private Coöperation.....	5,081.89	8,886.22
Donation from Game Fund.....	13,500.00	17,500.00
	\$95,094.90	\$119,437.58
State Appropriation.....	\$ 2,750.03	\$30,528.76
V. INDUSTRIAL SURVEY:		
Salaries and Wages.....		\$ 361.66
Supplies and Materials.....		9.93
Postage, Telephone and Telegrams.....		10.00
Travel Expense.....		89.80
State Appropriation.....		\$471.39
VI. GENERAL FORESTRY, PARKS AND PLANTING:		
Salary, State Forester.....	\$ 2,400.00	\$ 3,000.00
Salary, Staff.....	900.00	1,080.00
Office Supplies.....	30.45	25.30
Postage.....	45.00	120.24
Telephone and Telegrams.....	16.06	73.92
Field Travel.....	63.07	127.68
Printing Forms.....	9.20	32.54
Printing Publications.....	49.73	
Office Equipment.....	15.44	6.50
	\$ 3,528.95	\$ 4,466.18
<i>State Forests and Parks:</i>		
Salary, Assistant Forester.....	\$-----	\$ 2,100.00
Salaries, Staff.....	872.00	1,907.50
Labor.....	26.00	61.33
Office Supplies.....	15.75	34.60
Telephone and Telegrams.....	12.99	16.79
Express, Freight and Drayage.....	3.10	
Field Travel.....	100.75	204.37
Printing.....	6.52	11.58
Motor Vehicle Operation.....	38.89	293.59
Building Repairs.....	28.27	68.12
Fire Insurance.....		62.08
Household Equipment.....		299.72
Purchase of Automobile.....		508.21
	\$ 1,104.27	\$ 5,567.89
<i>Forest Planting:</i>		
Salaries, Staff.....	\$ 715.00	\$ 900.00
Labor.....	77.00	
Office Supplies.....	22.50	
Agricultural Supplies.....	482.95	851.08
Postage.....	10.00	21.77
Telephone and Telegrams.....	22.29	3.50
Express, Freight and Drayage.....	4.27	22.66
Field Travel.....	78.61	5.94

STATEMENT OF RECEIPTS AND DISBURSEMENTS—*Continued*
Biennium 1934-1936

	1934-35	1935-36
VI. GENERAL FORESTRY, PARKS AND PLANTING—<i>Continued</i>		
Printing.....	\$ 14.25	\$ 2.77
Motor Vehicle Operation.....	231.23	91.95
Repairs.....	7.50	9.29
Fire Insurance.....		39.19
Agricultural Equipment.....	36.10	16.30
Purchase of Land.....		2,013.50
	\$ 1,701.70	\$ 3,977.95
Total Expenditures.....	\$ 6,334.92	\$14,012.02
Less Receipts:		
Federal Coöperation.....	1,104.85	1,408.29
Sale of Seedlings.....	489.83	2,312.70
Sale of Publications.....	6.70	5.00
Permits, State Lakes.....	193.15	126.90
Park Concessions.....	188.98	140.53
	\$ 1,983.51	\$ 3,993.42
State Appropriation.....	\$ 4,351.41	\$10,018.60
DEPARTMENTAL SUMMARY:		
<i>Disbursements:</i>		
Administration.....	\$10,429.82	\$12,667.94
Water Resources.....	8,673.28	14,644.02
Mineral Resources.....	4,463.00	7,565.21
Forest Fire Prevention.....	97,844.93	149,966.34
Industrial Survey.....		471.39
General Forestry.....	6,334.92	14,012.02
	\$127,745.95	\$199,326.92
<i>Less Receipts:</i>		
Administration.....	\$ 20.61	\$ 34.85
Water Resources.....	1,022.41	1,195.12
Forest Fire Prevention.....	95,094.90	119,437.58
General Forestry.....	1,983.51	3,993.42
Advance from Contingency Fund.....		5,000.00
	\$98,121.43	\$129,660.97
<i>State Appropriation:</i>		
Administration.....	\$10,409.21	\$12,633.09
Water Resources.....	7,650.87	13,448.90
Mineral Resources.....	4,463.00	7,565.21
Forest Fire Prevention.....	2,750.03	30,528.76
Industrial Survey.....		471.39
General Forestry.....	4,351.41	10,018.60
Advance from Contingency Fund.....		—5,000.00
	\$29,624.52	\$69,665.95

DIVISION OF GAME AND INLAND FISHERIES

STATEMENT OF RECEIPTS AND DISBURSEMENTS

Biennium 1934-1936

	1934-35	1935-36
VII. INLAND FISHERIES:		
<i>Administration:</i>		
Salaries.....	\$ 800.00	\$ 1,320.00
Commissions.....	2,422.82	17.00
Office Supplies.....	7.54	21.84
Postage.....		88.80
Field Travel.....	74.33	99.13
Printing Forms.....	360.57	344.81
Publicity Service.....	10.80	28.64
Legal Costs.....	2.52	
Fire Insurance.....		51.00
Office Equipment.....	75.67	121.40
	\$ 3,754.25	\$ 2,092.62
<i>Morrison Hatchery:</i>		
Salary, Superintendent.....	\$ 1,220.00	\$ 1,320.00
Salaries, Staff.....	900.00	994.00
Supplies.....	2,945.46	2,930.82
Postage.....	14.24	9.60
Telephone and Telegrams.....	63.59	54.60
Field Travel.....	9.85	15.40
Motor Vehicle Operation.....	114.89	309.25
Lights and Power.....	78.26	64.99
Building Repairs.....	5.25	585.34
Equipment Repairs.....	5.00	12.45
Hatchery Equipment.....		137.50
Motor Vehicle Exchange.....	414.54	
Water Rights.....	1,125.00	
	\$ 6,896.08	\$ 6,433.95
<i>Murphy Hatchery:</i>		
Salary, Superintendent.....	\$ 900.00	\$ 1,150.00
Labor.....	267.50	575.25
Supplies.....	1,591.62	2,357.80
Postage.....	95	2.70
Telephone and Telegrams.....	33.84	36.81
Field Travel.....	1.50	
Motor Vehicle Operation.....	243.99	215.76
Building Repairs.....	475.18	335.20
Equipment Repairs.....	9.87	98.36
Hatchery Equipment.....	118.00	60.48
Motor Vehicle Exchange.....	314.54	
	\$ 3,956.99	\$ 4,832.36
<i>Stedman Hatchery:</i>		
Salary, Superintendent.....	\$ 900.00	\$ 1,080.00
Salary, Staff.....	360.00	376.00
Supplies.....	973.92	1,176.34
Postage.....	2.00	
Telephone and Telegrams.....	117.72	91.81
Express, Freight and Drayage.....	3.49	
Field Travel.....	30.00	4.50
Motor Vehicle Operation.....	626.11	422.98
Building Repairs.....	83.87	175.81

STATEMENT OF RECEIPTS AND DISBURSEMENTS—*Continued*
Biennium 1934-1936

	1934-35	1935-36
VII. INLAND FISHERIES—<i>Continued</i>		
Equipment Repairs.....	\$ 54.77	\$ 47.69
Hatchery Equipment.....	59.87	235.07
Motor Vehicle Exchange.....	549.00	-----
	\$ 3,760.75	\$ 3,610.20
<i>Roaring Gap Hatchery:</i>		
Salary, Superintendent.....	\$ 900.00	\$ 1,200.00
Labor.....	202.20	432.00
Supplies.....	2,313.74	2,770.83
Postage.....	2.50	2.00
Telephone and Telegrams.....	7.58	13.10
Field Travel.....	-----	1.53
Motor Vehicle Operation.....	347.29	231.81
Lights and Power.....	73.55	86.00
Building Repairs.....	261.00	56.10
Equipment Repairs.....	34.75	27.78
Hatchery Equipment.....	50.81	—31.74
Motor Vehicle Exchange.....	440.46	-----
	\$ 4,633.88	\$ 4,789.41
<i>Boone Hatchery:</i>		
Salary, Superintendent.....	\$ 900.00	\$ 1,080.00
Salary, Staff.....	360.00	432.00
Supplies.....	1,741.85	2,551.64
Postage.....	15.00	-----
Telephone and Telegrams.....	5.63	-----
Motor Vehicle Operation.....	332.05	348.38
Building Repairs.....	176.49	208.27
Hatchery Equipment.....	203.57	17.75
Motor Vehicle Exchange.....	372.50	-----
	\$ 4,107.09	\$ 4,638.04
<i>Lake Mattamuskeet:</i>		
Salary, Superintendent.....	-----	\$ 1,500.00
Salaries, Wardens.....	-----	900.00
Supplies.....	-----	19.19
Motor Vehicle Operation.....	-----	2.35
Purchase of Motor and Boats.....	-----	133.75
	-----	\$ 2,555.29
Total Expenditures.....	\$27,109.04	\$28,951.87
Less Receipts:		
Sale of Anglers' Licenses.....	\$31,476.06	\$36,062.36
Transfer from Preceding Year.....	-----	1,920.66
	\$31,476.06	\$37,983.02
Transfer to Succeeding Year.....	\$ 4,367.02	\$ 9,031.15
VIII. GAME:		
<i>Administration:</i>		
Salary, Commissioner.....	\$ 3,000.00	\$ 4,000.00
Salaries, Staff.....	10,850.84	16,221.67
Salaries, Wardens.....	49,906.62	79,233.77

STATEMENT OF RECEIPTS AND DISBURSEMENTS—*Continued*
Biennium 1934-1936

	1934-35	1935-36
VIII. GAME—Continued		
Stationery and Supplies.....	\$ 399.99	\$ 677.64
License Buttons.....	4,248.64	3,467.62
Postage.....	926.12	1,225.25
Telephone and Telegrams.....	315.62	711.26
Express and Drayage.....	198.07	310.63
Field Travel.....	7,754.77	10,362.82
Printing Forms.....	2,017.33	2,906.64
Printing Publications.....		2,941.19
Motor Vehicle Operation.....	545.24	590.46
Typing Records.....	35.30	54.09
Publicity Service.....	26.70	235.63
Legal Costs.....	60.50	150.00
Insurance and Bonding.....	1,287.96	1,308.56
Repairs, Equipment.....	110.82	39.98
Alterations, Office.....	243.00	.75
Equipment.....	1,227.82	223.45
	\$83,155.34	\$124,661.41
<i>Game Farm, Fayetteville:</i>		
Salary, Superintendent.....	\$ 1,410.00	\$ 1,680.00
Labor.....	180.00	216.00
Supplies.....	1,342.57	1,437.99
Sustenance for Labor.....	180.00	180.00
Travel Expense.....	78.60	105.55
Motor Vehicle Operation.....		22.00
Repairs.....	425.50	125.31
Equipment.....	236.49	702.29
	\$ 3,853.16	\$ 4,469.14
<i>Game Farm, Mt. Mitchell:</i>		
Salary, Keeper.....	\$ 270.00	\$ 502.00
Supplies.....	1,075.10	894.42
Motor Vehicle Operation.....	21.77	
Repairs.....	46.07	134.13
Equipment.....	1,434.29	600.54
Buildings.....	626.96	825.58
	\$ 3,474.19	\$ 2,956.67
<i>Refuges, General:</i>		
Salary, Superintendent.....	\$ 1,200.00	\$ 1,440.00
Office Supplies.....	2.35	7.84
Postage and Telephone.....	23.46	25.27
Travel Expense.....	77.89	76.71
Motor Vehicle Operation.....	717.11	602.16
Motor Vehicle Exchange.....		352.84
	\$ 2,020.81	\$ 2,504.82
<i>Mt. Mitchell State Game Refuge:</i>		
Salaries, Wardens.....	\$ 1,200.00	\$ 1,440.00
<i>Daniel Boone State Game Refuge:</i>		
Salaries, Wardens.....	\$ 690.00	\$ 1,320.00
<i>Wayah Bald State Game Refuge:</i>		
Salary, Warden.....	\$ 600.00	\$ 680.00

STATEMENT OF RECEIPTS AND DISBURSEMENTS—*Continued*
Biennium 1934-1936

	1934-35	1935-36
VIII. GAME— <i>Continued</i>		
<i>Guilford Game Refuge:</i>		
Salary, Warden.....	\$ 360.00	\$ 30.00
Rent of Building.....	150.00	12.50
	\$ 510.00	\$ 42.50
<i>Holly Shelter Refuge:</i>		
Salary, Warden.....	\$ 480.00	\$ 480.00
<i>Roaring Gap Refuge:</i>		
Salary, Warden.....	\$ 360.00	\$ 432.00
<i>P. R. Camp Refuge:</i>		
Salary, Warden.....	\$ 360.00	\$ 432.00
Rent.....	100.00	100.00
	\$ 460.00	\$ 532.00
<i>Migratory Bird Refuges:</i>		
Feed and Supplies.....		\$ 200.00
<i>Miscellaneous Accounts:</i>		
Bounties.....	\$ 137.30	\$ 79.30
Workman's Compensation.....	1,184.13	206.87
Rebuilding Lake Rim.....	24,704.47	5,212.35
Donation to Fire Control.....	13,500.00	17,500.00
Equipment River Patrol.....		1,991.05
Motor Boats Operation.....		410.02
	\$39,251.30	\$25,240.99
Total Expenditures.....	\$136,054.80	\$164,959.53
Less Receipts:		
Sale of Hunting Licenses.....	127,642.12	175,614.92
Refund of Bounty Payments.....	2,780.50	759.68
Sale of Building (Asheboro).....	750.00	
Special Licenses.....		213.00
Appropriation from Contingency Fund for Rebuilding Lake Rim.....	9,250.00	
Transfer from Preceding Year.....	24,269.17	31,083.35
	\$164,691.79	\$207,670.95
Transfer to Succeeding Year.....	\$28,636.99	\$42,711.42
<i>Divisional Summary:</i>		
Total Expenditures.....	\$163,163.84	\$193,911.40
Less Receipts.....	196,167.85	245,653.97
	\$ 33,004.01	\$ 51,742.57

Financial statement of Division of Commercial Fisheries follows report of this Division.

DIVISION OF COMMERCIAL FISHERIES

The fishing industry is one of North Carolina's most valuable natural resources. There is no possible way of estimating its true value to this and future generations, but the true worth should run into millions of dollars. Many thousands of people are engaged in it and many more thousands are in one way or another affected by it. It should be given every reasonable protection.

The industry during this past biennium has experienced a substantial gain, every branch having shown a marked increase in production. The factors that usually control in this industry have been much more favorable during this period than in recent years. The fishermen have weathered the depression and now have their boats and nets back to normal again; they also have enjoyed better prices for their catch than they did during the past two bienniums.

FOOD FISH

More people in a wider area are engaged in food fishing than any other branch. Some time during the year it extends to all of our waters, both inside and outside. During no single day in the three hundred sixty-five, except Sunday, is net fishing not done. During the last year of this biennium the fishermen have enjoyed a better market for their fish than they have for a long time, due in part to better facilities for handling their product. However, the past shad season was the worst ever experienced, due partly to flood waters in all the rivers during the shad fishing season. The fact that the herring season comes a little later than the shad season accounts for the normal catch this activity enjoyed last year. Fishing, in general, has been better on the inside for the past two years on account of the opening of New and Durm Inlets. These improved conditions have enabled the fishermen to replace many of their boats and nets. The outlook is toward a steady increase in this important industry for the reason that better equipment to handle fish than ever before is available. There have been caught during this biennium 98,055,000 pounds of food fish at a value of \$2,859,500.

SHRIMP

Shrimping, in a commercial way, is a local activity and has been confined throughout the years to two counties, Brunswick and Carteret; but during the past season a great many shrimp were caught in Pamlico County. However, Brunswick continued to be the banner county, having produced 678,467 pounds more of shrimp for the biennium than Carteret. The production of the latter county has been proportionally larger than in previous years. Shrimp in great quantities have been lying off Beaufort Inlet in easy reach of our trawlers and we are hopeful that they will continue to return to these waters seasonally. During the past biennium we produced 4,680,746 pounds of shrimp at a value of \$280,904.76, which is more than double the production the previous biennium.

MENHADEN

More capital is required to finance this activity than any other phase of the fisheries. The factories and equipment cost hundreds of thousands of dollars. As a rule the season lasts only a couple of months—October, November and part of December. During the past season there was the largest catch of menhaden in the spring of the year than for a like period during the past twelve or fifteen years. Most of these fish are caught at sea during the fall season as they pass the North Carolina Coast on their way south; and the number of menhaden caught is wholly dependent on the weather, because the fish strike in here during the rough, bad weather. They have passed by before the boats can get out again if the rough weather lasts long. This phase of the industry employs a large number of men who have nothing at stake, except their labor, as the boats and equipment are furnished by the operators. If weather conditions are favorable, the men make good wages. During the past biennium 210,905,000 menhaden were caught; 665,785 gallons of oil were manufactured; and scrap in the amount of 18,100 tons was marketed. In this industry approximately \$200,000.00 is invested in boats; \$35,000.00 in nets and equipment; and \$200,000.00 in factories.

OYSTERS

This branch of seafood industry suffered a severe setback during the September storm of 1933, which sanded up and killed most of the oysters; but under the CWA, ERA and WPA we have planted in Dare, Hyde, Pamlico, Carteret, Onslow, Pender, New Hanover, and Brunswick Counties 2,133,506 bushels of oysters and shells. We are hopeful that this work will, in some measure, offset the loss suffered from the storm. This planting was done at a cost of \$193,102.24, or an average of .09 per bushel. Without some setback it is hoped that this part of the industry will be back to normal in a few years, although the Bureau of Fisheries through its representative, Dr. Prytherch, stationed at the laboratory at Beaufort, has found a lot of borers, whose activity at the present time is confined to Core Sound. He has advised trapping these pests as the surest method of keeping them from spreading to larger areas or possibly getting rid of them altogether. In his experiments with this method, he has had great success and has found it can be done at a nominal cost. He has recommended that this Department offer a bounty to induce the fishermen to trap the borers and thus destroy as quickly as possible this natural enemy of the oyster. During the past biennium the State has produced 407,754 bushels of oysters at a value of \$142,713.90, which is 107,000 bushels more than were marketed in the previous period.

CLAMS

The clam industry has had a marked gain during the past biennium. This gain followed the opening of Drum Inlet, which was cut through Core Banks during the September storm, letting sea water into Core Sound and

thus adding to its salinity. The clams are now growing in a much larger area than they have ever grown before and in much greater quantities. This part of the industry affords a livelihood for fishermen during the summer months when general fishing is at its slackest. The clams are sold by the catchers to the bedders, who put them on the northern markets during the winter months or sell to out-of-State trucks. During the past few years clams have been produced in commercial quantities only in Brunswick and Carteret Counties. The latter county produces more than all of the other combined clam growing counties in the State. During the past biennium we produced 94,832 bushels of clams at a value of \$118,540.00, an increase of 32,124 bushels over the previous biennium.

ESCALLOPS

Carteret is the only scallop-producing county in the State. At one time this was one of the most valuable industries in this county, but for the past several years it has almost been wiped out because of the disappearance of grass in the sounds. Government specialists have not been able to determine what killed out the grass along the Atlantic Coast. The grass for the past season has been coming back in some sections, particularly in Core Sound; and there has been a great pickup in this part of the industry. The gain is nine hundred percent over the last biennium, though the total production was insignificant in comparison with that ten years ago. During the past biennium the production was 18,708 gallons of scallops, valued at \$37,417.00.

CRABS

The soft-shell crab is caught in commercial quantities only in Carteret County during the months of April and May. The production of crabs is so much greater in Maryland than it is in North Carolina that this State's market is stopped practically at a standstill immediately after the opening of the crabbing season in that State. North Carolina's season opens about two months before Maryland begins to produce crabs in commercial quantities, and the out-of-State buyers leave as soon as the season opens there. A large number of people make good wages at this work during April and May. The State produced 160,922 dozens of crabs, valued at \$160,922.00, during this biennium. The hard or blue crab is found all along the coast and has been more valuable during the past two seasons than ever before. On account of the severe weather which killed out the crabs on the Chesapeake Bay last winter much larger production and sales were recorded here. This activity has grown to be one of the most active of the entire fishing industry. There is an ever-increasing demand for hard crab meat. The number of crab meat houses in this State during this period reached fifteen. Many loads of hard crabs were hauled away by out-of-State trucks for Virginia and Maryland crab houses.

REPORT OF SANITARY ENGINEER

CAPTAIN J. A. NELSON,
*Fisheries Commissioner,
 Morehead City, N. C.*

DEAR SIR:

I have the pleasure of submitting herewith report of shellfish sanitation work conducted by this office for the biennium ending June 30, 1936. This report does not go into detail of the work carried on, but covers in a general way the various activities.

Great progress has been made in shellfish sanitation during the past two years. Seafood dealers have learned that it is to their advantage to handle their products in a clean, sanitary manner and have built or improved their plants so that we now have packing plants that will compare favorably with any on the Atlantic Coast.

Close sanitary supervision over the crab meat packing industry has had much to do with the development of this now important seafood industry in North Carolina. This office, in coöperation with the U. S. Food and Drug Administration, has maintained regular inspection and laboratory control over all inter-state shipments. Fifteen crab meat plants located from Morehead to Manteo operated in the State during this biennium, giving employment to several hundred people.

Regular monthly inspections and constant laboratory control work have been carried on in the oyster and clam packing and shipping industries, to meet the requirements of the U. S. Public Health Service for inter-state shipments. An average of fifty shucking and packing plants and seventy-five shell-stock plants operated during the biennium. Several new and modern oyster shucking houses were constructed, and with the general improvement in business conditions further improvements are being made. A system of rating or classifying the plants according to the type of construction and the manner of operation is now being worked out. This will help create a keener interest in shellfish sanitation, as each plant or manager will strive to maintain a good sanitary rating.

Sanitary surveys were made of producing and new areas being developed along the coast. It was not found necessary to restrict any additional waters on account of pollution during this biennium. Further work along this line is needed, since more and more raw sewage is being discharged into streams leading into our producing areas. Constant supervision over the patrolling of the restricted areas was also maintained, and several individuals were prosecuted in court for taking shellfish from these polluted areas. Due to this strict supervision, no shipments were turned down and condemned on out-of-State markets.

If the seafood industry is to continue to improve and afford better living conditions for the people engaged, it is and will increasingly be very important that a Division of Shellfish Sanitation be set up and maintained at a high standard. North Carolina cannot afford not to furnish qualified technical supervision for this highly important industry, which is the source of livelihood for several thousand people.

A. B. FREEMAN,
Assistant Sanitary Engineer.

DIAMOND-BACK TERRAPIN

Some years ago the diamond-back terrapin was in great demand. Because of this fact and in order to give our fishermen what aid we could toward supplying this demand—terrapin of best quality were selling on northern markets as high as \$60.00 per dozen—this State in coöperation with the

Federal Government began the propagation of diamond-back terrapin at the U. S. Bureau of Fisheries at Beaufort, North Carolina. Cement pens were built and two thousand adult terrapins were bought for brood stock. In the course of time there were liberated yearly in our waters at selected points five to ten thousand young terrapin. This has been going on for ten years, with the result that terrapin are more plentiful in our waters than ever before. For some years the demand for this choice food has not been so great as previously. However, the market is becoming more active and, of course, the price is becoming more attractive. If and when the demand for this product does increase appreciably, our fishermen will reap a comparatively rich harvest that this Department and the Federal Government have made possible. This is one of the constructive measures the Division of Commercial Fisheries has fostered in an active, practical way.

PATROL BOATS

Three of our patrol boats are thirty years old and are, therefore, obsolete and should be replaced with new boats. Often the time element plays a large part in the enforcement of our regulations. Yet these boats cannot be made to render the service required of them, because they are slow and unseaworthy when compared with the more modern boats with which they must compete. Each of these boats has large bodies of water to patrol and it is readily seen that more territory is left unprotected for larger periods of time than would be the case with speedier and more seaworthy boats. And, too, the operating expense of a new boat would naturally be less. The Pamlico, Albemarle and Chowan should be disposed of and new boats put on patrol in their place. The John A. Nelson, the largest of our fleet, is stationed at Morehead City and is used by the Commissioner for general supervision in the Sounds. It is used in the ocean at Ocracoke and Hatteras during the winter months to look after the out-of-State trawlers. The Roanoke, the speed boat, is also located at Morehead City and is used by one of the inspectors for collecting licenses and patrolling the closed territories where oysters and clams are not allowed to be taken. The Pamlico is stationed at Belhaven, and is used by an inspector for patrolling Pamlico Sound, Pamlico and Pungo Rivers. The Neuse, one of our small boats, is stationed at New Bern, and is used by an inspector for patrolling Neuse River. The Albemarle and the Croatan are stationed at Manteo, and are used by an Assistant Commissioner, who has charge of staking off fishing limits, enforcing the law and collecting licenses in the lower Albemarle Sound and Upper Pamlico Sound. The Chowan is stationed at Edenton and is used by one of the inspectors at that point. He patrols the waters of upper Albermarle Sound, Chowan, Roanoke, Perquimans, Cashie and Scuppernong Rivers, collecting licenses and enforcing the fishing regulations. These boats should be on duty the year round to keep the fishermen informed of the regulations and laws as well as to protect the industry against would-be violators.

KIND, QUANTITY AND VALUE OF FISH TAKEN IN WATERS OF NORTH CAROLINA
For the Period July 1, 1934, to June 1, 1936

Kinds of Fish	No. of Pounds	Value
Spotted Trout.....	3,700,000	\$ 222,000.00
Gray Trout.....	15,000,000	450,000.00
Sea Mullet.....	1,200,000	24,000.00
Blue Fish.....	1,000,000	30,000.00
Mullet.....	6,000,000	180,000.00
Croakers.....	14,000,000	210,000.00
Spots.....	10,000,000	200,000.00
Hogfish.....	500,000	10,000.00
Mackerel.....	400,000	20,000.00
Shad.....	3,000,000	750,000.00
Herring.....	35,000,000	350,000.00
Butters.....	1,600,000	48,000.00
Carp.....	200,000	12,000.00
Rock or Striped Bass.....	700,000	105,000.00
Flounders.....	2,000,000	80,000.00
Puppy Drum.....	500,000	20,000.00
White Perch.....	1,000,000	60,000.00
Assorted.....	1,000,000	30,000.00
Cats.....	450,000	22,500.00
Eels.....	60,000	3,000.00
Jack.....	500,000	25,000.00
Pike.....	20,000	1,000.00
Pompano.....	12,000	1,200.00
Channel Bass.....	200,000	4,000.00
Sturgeon.....	5,000	1,000.00
Sheepshead.....	8,000	800.00
Total Food Fish.....	98,055,000	\$ 2,859,500.00
Shrimp.....	4,681,746	280,904.76
Menhaden (No. of Fish).....	210,905,000	1,054,425.00
Total Value of Fin Fish.....		\$ 4,194,829.76

SHELLFISH

Oysters.....	407,754 (Bushels).....	\$ 142,713.90
Clams.....	94,832 (Bushels).....	118,540.00
Escallops.....	18,708 (Gallons).....	37,416.00
Soft-Shell Crabs.....	160,922 (Dozens).....	160,922.00
Hard Crabs.....	10,000,000 (Pounds).....	200,000.00
Diamond-Back Terrapin.....	5,000 (Pounds).....	937.50
Total Value of Shellfish.....		\$ 660,529.40

TOTALS

Value of Fin Fish.....	\$4,194,829.76
Value of Shellfish.....	660,529.40
Total Value Water Products.....	\$4,855,359.15

STATEMENT OF RECEIPTS AND DISBURSEMENTS OF THE DIVISION OF COMMERCIAL FISHERIES, DEPARTMENT OF CONSERVATION AND DEVELOPMENT

For Biennium 1934-35—1935-36

	1934-35	1935-36
ADMINISTRATION AND INSPECTION:		
Commissioner's Salary.....	\$ 3,000.00	\$ 3,600.00
Assistant Commissioners' Salaries.....	1,327.00	1,411.67
Commission Employees' Salaries.....	6,185.12	5,826.31
Office Staff.....	2,393.00	3,420.00
Office Supplies.....	245.54	95.94
Postage and Box Rent.....	164.25	164.25
Telephone and Telegrams.....	270.64	250.00
Traveling Expense—Commissioner.....	317.82	138.52
Printing and Binding.....	619.46	591.42
Motor Vehicle Operation.....	831.90	632.60
Office Rent.....	700.00	700.00
Counsel Fees.....		500.00
Insurance and Bonding.....	92.00	99.12
Equipment.....		62.00
Other Expenses.....	10.00	8.00
Total.....	\$ 16,156.73	\$ 17,499.83
PATROL BOATS:		
Salaries and Wages.....	\$ 3,490.93	\$ 3,199.50
Supplies.....	1,263.21	1,051.11
Gas and Oils.....	1,384.94	1,323.99
Repairs.....	486.07	2,279.91
Equipment.....	196.31	562.55
Subsistence.....	839.00	687.50
Docks and Warehouses.....	100.00	175.00
Marking Fishing Limits.....	122.93	395.04
Fire Insurance—boat J. A. Nelson.....	130.00	130.00
Total.....	\$ 8,013.39	\$ 9,804.60
SHELLFISH SANITATION:		
Supplies and Materials.....	\$ 52.10	\$ 57.04
Equipment.....	20.28	
Total.....	\$ 72.38	\$ 57.04
Total Expenditures.....	\$ 24,242.50	\$ 27,361.47
Less Receipts.....	24,257.29	21,605.20
Credit Balance.....	\$ 14.79	\$
Appropriation.....		5,756.27
RECEIPTS:		
Food Fish Licenses and Taxes.....	\$ 8,900.77	\$ 8,386.85
Oyster Licenses and Taxes.....	4,729.39	4,615.94
Escallop Licenses and Taxes.....	515.60	472.30
Clam Licenses and Taxes.....	1,810.43	2,120.37
Crab Licenses and Taxes.....	3,951.82	1,500.52
Menhaden Licenses.....	2,234.75	1,987.75
Power Boat Licenses.....	289.00	225.00
Other Sources.....	1,825.53	2,296.47
Total.....	\$ 24,257.29	\$ 21,605.20

DIVISION OF COMMERCE AND INDUSTRY

Although this Division has had no full-time personnel during the biennium, its functions have been maintained to a limited degree through the office of the Assistant Director.

The collection of state data and statistics, particularly industrial and commercial, has continued; and the public has been served by the dissemination of available information requested by numerous individuals and organizations. There have, however, been no facilities for classification, collation, and analyzing of these data and statistics for their more effective use.

This Division has continued to serve as a clearing house for public information concerning various activities of the Department. The people of the State have been familiarized with the general conservation program and also with the status of the work of the different Divisions by means of news and feature copy provided for the press and the radio.

Press: The newspapers of the State have continued their coöperation by giving freely of their space to news and feature articles on conservation. They have also supported editorially the various activities directed toward obtaining the most effective use of the State's natural resources and for their preservation for future generations. Their familiarity with the problems confronting the State and her resources has made this co-operation doubly valuable; and, to no small degree, much of the progress toward more effective conservation and development has been made possible by the assistance of the press. The Department takes this means of expressing its appreciation for the valuable aid rendered by the press of the State.

Radio: Because of restricted personnel, the Division was unable to continue weekly broadcasts which had been given in previous years during the first part of the biennium. However, the approval of an educational project by the Emergency Relief Administration in June, 1935, made possible the resumption of the Department's radio programs. All facilities of the radio stations were made available without cost, and the Department expresses its gratitude to the various stations for their effective coöperation.

Cecil E. Bell, an experienced radio announcer, was employed with funds furnished by the ERA to prepare and deliver a regular weekly schedule of dramatized conservation programs. These programs were handled each week by six North Carolina stations and for part of the time by all the broadcasting companies in the State. Mr. Bell continued this work for about six months and at the end of that period he was retained by the Department for the same purpose and to assist in the preparation of publications. Near the latter part of the biennium, Mr. Bell was assigned to the special study of resources and industries mentioned later in this report.

"Come to North Carolina": An attractively illustrated brochure under this title was brought out in March, 1936, for general tourist information. This was the first literature of this nature issued by the Department since 1927.

The booklet is a guide to the historical, recreational, and scenic attractions of the State, featured by a small-scale map on which various points of outstanding interest are spotted. Its cover and the map were done in four colors and numerous illustrations were used in the text.

Because of limited funds, only 44,000 of the booklets were printed. Even before the press run was complete, requests for at least double the number available had been received, and it was necessary to cut each allotment more than half. The principal distribution of the publication was through travel agencies scattered throughout the country. Some of these began requests for more copies within a few weeks but it was possible to furnish only a limited number of these. Chambers of Commerce in the various cities of the State also coöperated with the Department in distributing the booklet, and few of these received a sufficient number to meet their demands.

Within approximately 60 days, the entire supply of the publication, with the exception of a small number retained for meeting individual inquiries received by the Department, had been distributed. Requests for thousands of copies since that time could not be met.

According to numerous comments received by the Department, the brochure, together with an attractive four-color highway map issued by the State Highway and Public Works Commission, was an important factor in one of the best tourist seasons experienced in years in North Carolina. The Department is seeking means of bringing out a reprint of the publication.

Conservation Text: It has been the plan of the Department to urge that the study of conservation be prescribed in an appropriate grade in the public schools of the State. With this idea in view, a proposed text book is now under preparation. The subject is being treated in such a manner as to interest as well as inform the pupil concerning the great natural resources with which the State has been endowed and to create a more wholesome respect for these gifts of the Divine Creator.

Preliminary copy has been prepared and will be ready for publication when checked thoroughly and revised, if approved by the educational authorities. Manuscript should be completed within the next fiscal year.

Informational Leaflets: In order to meet numerous requests for general information concerning the State, the Division has issued several mimeograph sheets.

One of the most popular of these leaflets is "Facts About North Carolina", first compiled several years ago but which has been brought up to date several times. General data on population, geography, industry, climate, education, highways, history, natural resources and other subjects are contained in this sheet. It has been reissued probably a score of times and thousands of copies given out. The principal distribution has been to North Carolina school children; and in addition, hundreds have been used for response to inquiries for general information on the State.

Another mimeograph issued by the Division was under the title, "Conservation Suggestions for Organized Groups." This circular is intended to answer such questions as: "What is conservation? Why is it necessary? How does it affect life, health, and happiness?" The sheet describes briefly the objectives of conservation, and suggests particular research and projects

dealing with natural resources. It is designed especially for distribution to organizations interested in various phases of the Department's program.

Report on Resources and Industries: The Division is coöperating with the Division of Water Resources and Engineering in the compilation of a report on the resources and industries of the State. This study was started near the closing of the biennium, and is scheduled to be completed by the end of the calendar year.

The report is being made at the request of Governor Ehringhaus, and it is hoped that regular inventories of this nature may be continued as one of the functions of the Department. Data gathered during the survey are intended as an index to guide future development and to encourage a more thorough utilization of all the resources of the State.

Industrial Promotion: During the early months of this biennium the calls for information from industrial and commercial concerns interested in locating in the State have been infrequent, but with improving general conditions there is an increased demand for this type of data.

More adequate facilities for gathering and utilizing basic industrial information are needed if the Department meets demands for these data. It is believed that intelligent efforts of this nature to promote the industrial and commercial development of North Carolina will be a sound investment.

If a State advertising fund is provided, the demands for reliable and up-to-date information on raw materials and facilities of a widely varied character will be intensified. Inquiries for definite data will be more frequent and should be followed up intelligently and thoroughly.

DIVISION OF FORESTRY

There are two State agencies dealing with State-wide Forestry in North Carolina, each coöperating with its separate bureau of the United States Department of Agriculture under the Clark-McNary Law. These are the Forestry Division of the Department of Conservation and Development, commonly known in the field as the State Forest Service; and the Forestry Division of the Agricultural Extension Service. This latter receives aid through the United States Agricultural Extension Service. R. W. Graeber, extension forester, whose office is at State College, coöperates with the State Forester in the distribution of tree seedlings produced by the Department of Conservation and Development in its forest nursery for forest planting on the farms of the State.

The Division of Forestry has for convenience in bookkeeping as well as in administration been divided into four branches. By far the largest and most important branch is that of Forest Fire Control which has been in charge of W. C. McCormick since May, 1934. During that time a number of changes in personnel, a very considerable extension of the area, and an increase in available funds have taken place. According to officials of the United States Forest Service, the proportion of forest land now under proper protection in North Carolina is greater than that of any state in the southeastern region.

The branch of Forests and Parks was until August, 1935, in direct charge of the State Forester. With the greatly increased work, due to the coöperation of the National Park Service in the acquisition and development of State Parks through the Emergency Conservation Work, competent assistance became imperative, and the services of Thomas W. Morse, a trained landscape architect with considerable business experience, were secured. He, with the efficient assistance of Miss Annie Ramsey, who had previously been responsible for the major part of the business connected with park development under ECW, now handles the State Park work with energy and effectiveness.

The remainder of the forestry work, including supervision of the State Forest Nursery, the various Federal and State contacts and such educational work as it is possible to do under the limited appropriation, are carried on directly by the State Forester and his Secretary.

Some additional clerical help has been received through a WPA project in both the Park and the Forester's office for which thanks are due this Federal relief organization. With the rapid expansion of the forest planting program and the development of the enlarged forest nursery an assistant forester, trained and experienced in nursery and planting work, has become a necessity. Provision for such a man will be asked of the next General Assembly.

Unfortunately through lack of proper State office accommodation it has been necessary to divide the work and personnel of this division, Mr. Morse with his Federally-paid clerical force occupying rooms in the Commercial Bank building, while the ECW, which is closely tied up with the State Forester and with the Forest Fire Control branch, is also located several

blocks away from the State office. Not only does this situation consume unnecessary time but it prevents close contact of administrative officials, contributing thereby towards inefficiency. A State building where the whole department can be together and function as a unit seems to be one of the principal needs at the present time.

In addition to the State forestry agencies operating in North Carolina there are a number of regular as well as emergency Federal agencies covering parts or all of the State. Some brief reports of the activities of the more important ones are included in this report.

FOREST FIRE CONTROL

The branch of forest fire control of the Forestry Division of the Department has made considerable progress within the period covered by this report. A substantial increase in the state appropriation was made available for this work through the action of the last legislature, which made possible the broadening of activities and put under protection additional counties and areas of privately-owned timberland. The Federal Government, under the Clarke-McNary Law, which provides that the government will reimburse qualifying states not in excess of 50 per cent of monies spent by such states for forest fire prevention, appropriated \$50,560 per year for the two years. Increased county funds through the inclusion of additional counties and additional county appropriations were needed; increased private funds through the coöperation of additional timberland owners, together with a larger State's appropriation for the last half of this biennium, were responsible for our ability to expand. The result was that the fire control section of the Division of Forestry has been supervising the largest acreage ever placed under protection in the history of the State, which automatically increased the field personnel to the largest number of employees ever under appointment; and while a most severe fire season was encountered during the spring and summer of 1936, every fire within a coöperating county or upon a coöperating unit was handled in a satisfactory manner and thousands of acres of timberland saved from destruction.

Personnel: Because of the demand for foresters made by government agencies and the enlarged program of the fire control organization, a considerable turnover in personnel during this biennium was encountered. At the beginning of this biennium there were six established forestry districts, with only three District Foresters handling the work. This was due primarily to the fact that salaries had been reduced to such a point that Federal agencies had been able to take away many of our technically trained and experienced foresters. This condition existed until late in the spring of 1935.

Of the three District Foresters above mentioned, L. A. Carter resigned January 14, 1935, to accept work with the U. S. Soil Conservation Service, leaving only two experienced men. On October 15, 1935, W. A. Peterson resigned to accept work with the Resettlement Administration, leaving only one.

Through meager savings made in the salaries of these resigned District Foresters, it was possible to appoint J. B. Lattay, a technically trained and

experienced forester, on April 16, 1935, to replace Mr. Carter. In May, through further savings in salaries, it was possible to appoint J. R. Spratt and J. M. Stingley, both graduates in Forestry from the N. C. State College, as District Foresters, both men having had practical experience. In July, 1935, J. D. Findlay, also a graduate of N. C. State College in Forestry, was engaged as District Forester. In November, 1935, P. W. Tillman, a graduate forester with several years' experience in the U. S. Forest Service, was appointed District Forester. Therefore, on January 1, 1936, W. K. Beichler, the remaining Senior District Forester, had charge of the two mountain districts with a District Forester in charge of each of the four eastern districts, making a total of six District Foresters, one acting as Assistant District Forester in a training capacity.

Dan Blake of Asheville was appointed District Ranger in November, 1934. J. R. Miller, who had been in the service for a number of years, took leave, without pay, effective June 30, 1936, due to the condition of his health. On June 1, 1935, W. S. Ragsdale, former County Warden, was promoted to District Ranger; Ragsdale resigned effective June 30, 1936. District Forester W. K. Beichler was promoted to Forest Inspector and transferred from Asheville to the Raleigh Office effective July 1, 1936.

On July 1, 1935, through a rearrangement of the forestry areas, District 3 headquarters was established at Rockingham in the new Federal Building; District 5 headquarters was transferred from Washington, North Carolina, to Rocky Mount. The six district headquarters on June 30, 1936, were as follows: District 1, Asheville; District 2, Lenoir; District 3, Rockingham; District 4, New Bern; District 5, Rocky Mount; and District 6, Fayetteville. All of these offices are in Federal buildings or city offices, with the exception of Fayetteville.

Present Organization: The organization of the forest fire control branch of the Division of Forestry as set up July 1, 1936, is as follows: the Assistant State Forester as Chief of Forest Fire Control; a Forest Inspector and three office assistants constitute the Central Office force; and the Chief of Forest Fire Control and the Forest Inspector both work out of the Central Office at Raleigh.

Five District Foresters, technically trained and with practical experience, are in charge of fire control activities in six Districts. Six District Forest Rangers, non-technical, promoted from the warden ranks, serve as assistants to the District Foresters in field activities and direct contact men with the warden organization in the field. Six Clerk-Stenographers, one in each District Office, handling all office routine, accounts, etc. Fifty-six County Forest Wardens, one in each coöperating county, in charge of fire control within the county. Ten Association Rangers on as many associations. All of these County Wardens and Rangers are full-time men, and all taxpayers, who devote their entire time to the work assigned them. In many cases the County Wardens are combination Forest, Game and Fish Wardens and are jointly paid by the three divisions. Twenty-nine of these County Wardens and five Association Rangers are supplied with a State-and-county or Association-owned fire-fighting truck. Each county is divided into fire districts averaging about 14,000 acres of timberland to the district and a District Forest Warden working directly under the County Warden in

charge of each of these county fire districts. District Wardens are paid on an hourly basis for the exact amount of time they devote to the work. District Wardens sign up Pledged Crews of fire fighters, who respond to their calls and work with them on all fires, thereby forming a trained fire fighting crew rather than depending on pick-up labor. This has proven very satisfactory.

During the fire season, which usually runs from November 1 until the middle of May, towermen were employed at each of the 66 lookout towers and five other points which were manned for this purpose, making a total of 71 seasonal employees during the fire period in detection work. There were approximately 200 men employed during the fire season who form three-to five-man fire crews which were stationed at certain towers throughout the coöperating counties and on protective associations.

The above listed full-time and seasonal employees, together with District Wardens, averaging approximately 15 to the county, bring the total number of permanent and part-time employees up to approximately 1,100. The 22 employees comprising the Raleigh and field headquarters personnel are entrusted with the supervision, disbursement of funds and all work connected with the direction of 56 County Wardens and approximately 1,000 seasonal employees and fire control plans and activities necessary in the protection of approximately 14,000,000 acres of forest land or 75 per cent of the total forested area of the State needing protection.

PROGRESS CHART

	June 30 1932-33	June 30 1933-34	June 30 1934-35	June 30 1935-36
District Foresters.....	3	3	3	6
District Forest Rangers.....	4	4	4	6
County Forest Wardens.....	30	33	44	56
District Forest Wardens.....	803	884	800	1,000
Counties Coöperating.....	30	33	44	56
Private timberland owners coöperating.....	35	54	62	77
Forest area under protection (acres).....	5,804,343	6,405,975	9,862,289	13,634,000
FINANCES:				
Appropriation, Counties.....	\$ 23,150	\$ 17,845	\$ 36,020	\$ 53,000
Appropriation, Private Owners.....	5,064	4,400	5,430	9,100
Appropriation, State, for FFC.....	4,740	2,755	2,755	24,930
Game Fund Transfer.....	17,000	11,000	13,000	15,000
Appropriation, Federal.....	50,560	36,000	50,560	50,560
Total Appropriation.....	\$ 100,514	\$ 72,000	\$ 107,765	\$ 152,590
Cost per acre for area protected.....	1.7 cents	1.1 cents	1.1 cents	1.12 cents

Note: In June-July, 1936, a complete new survey was made of the forest area needing protection in the State and the cost of giving this area adequate fire protection. Results:

Total forest area needing state protection.....20,339,122 acres
Annual cost per acre of adequate protection.....4.9 cents

This cost is based upon an allowable annual burn of 1.18 per cent of the forest area. It represents, then, an annual expenditure of less than 5 cents to protect an acre of forest land which can be conservatively valued at from \$10-\$15.

County Coöperation: Prior to July 1, 1935, county coöperation with the State in fire control was voluntary. In event a county did not wish to coöperate with the State there was no law empowering the State to establish fire control in such county, with the result that throughout the several forestry districts there were numerous counties not coöperating and in some instances completely surrounded by coöperating counties. Fires originating in these non-coöperating counties spread into coöperating counties, uncontrolled, materially increasing the cost of protection in coöperating counties.

A law, enacted in 1935 by the Legislature, broadened the powers of the State Forester through permitting the establishment of a fire control organization in any county in which, in the State Forester's estimation, based entirely upon existing fire conditions and timber values at stake, fire control was necessary. While it has not yet been necessary to use this law, its existence is believed to have been instrumental in securing the voluntary coöperation of some previously non-coöperating counties, with the result that on June 30, 1936, the counties formed a solid block of coöperating units from Virginia to the South Carolina line through the Coastal Plains and Sandhill Section of the State in which the greatest fire hazard exists. The number of coöperating counties increased from thirty-two in 1934 to fifty-six in the spring of 1936 and additional counties have signed agreements to coöperate, effective July 1, 1936. From July 1, 1934, to June 30, 1936—the period of this report—no county dropped out of the organization nor have any indicated a desire to do so. This is a condition that did not exist prior to the passage of the law. This makes possible the planning of fire control work over a period of years without the constant fear of a county withdrawing if and when it chooses, thus breaking down the organization to that extent. On next page will be found a tabulation showing coöperating counties with sums made available by them for the past several years and the dates on which they begin coöperation with the State in fire control.

Private Coöperation: In addition to the county coöperative setup, individual timberland owners, or groups of timberland owners may list with the State their holdings where the total acreage is not less than 30,000 acres. The assessment rate on these lands varies according to what is considered necessary to give adequate protection and usually ranges from one to ten cents per acre, this sum being matched by an equal amount of State and Federal funds. On June 30, 1936, there were 13 protective associations functioning. These associations embrace approximately 400,000 acres and are owned by 77 landowners. With four exceptions, all of these holdings are within the boundaries of coöperating counties.

The funds provided by these coöperators are forwarded to the State at the beginning of each fiscal year and deposited in a special fund for disbursement by the Division of Forestry. Budgets are prepared at the beginning of each fiscal year covering each association and reports showing accomplishments and disbursements are supplied each coöperator at the end of each fiscal year. The funds provided by the coöperators enable additional protection to their timberlands, through the purchase of tractors, fire line plows, road machinery and other equipment necessary in the construction and maintenance of plowed fire lines; building of spur telephone

COUNTIES COOPERATING AND ANNUAL SUMS MADE AVAILABLE BY THEM

County	1932-33	1933-34	1934-35	1935-36
Alleghany.....	\$.....	\$.....	\$ 500	\$ 750
Anson.....			700	700
Avery.....	500	500	500	600
Beaufort.....			1,250	1,250
Bertie.....	680	1,000	1,000	1,500
Bladen.....			1,500	1,500
Brunswick.....			2,000	2,000
Buncombe.....	1,000	1,000	1,000	1,000
Burke.....	1,300	1,300	1,300	1,300
Caldwell.....	1,000	1,000	1,000	1,000
Chatham.....		1,200	1,000	700
Clay.....	400			
Columbus.....				1,500
Craven.....		1,000	1,000	1,100
Cumberland.....	600	750	750	825
Durham.....	700	700	700	700
Duplin.....				1,500
Edgecombe.....	500	650	1,000	1,000
Graham.....			600	700
Greene.....	500	500	600	600
Halifax.....	600	600	1,000	1,000
Harnett.....	500	500	500	700
Haywood.....	400	400	400	400
Henderson.....	500	400	400	400
Hertford.....	500	600	750	750
Hoke.....		400	400	300
Jackson.....		420	570	600
Jones.....				750
Johnston.....			1,600	1,250
Lee.....	300	300	300	300
Lenoir.....			800	800
Macon.....	565	500	500	500
Montgomery.....	750	750	750	750
Moore.....	1,000	1,000	1,100	1,250
Martin.....				800
Nash.....			1,000	1,250
Northampton.....	500	500	750	750
Onslow.....				850
Pitt.....			1,200	1,200
Polk.....		300	500	500
Pender.....				1,500
Richmond.....	1,000	1,200	1,200	1,250
Robeson.....		1,628	2,520	1,500
Rutherford.....	1,000	1,000	1,000	1,000
Sampson.....				1,500
Scotland.....	600	600	600	600
Stanly.....				700
Surry.....	200		500	600
Transylvania.....	600	600	600	600
Union.....				750
Warren.....	500	600	750	750
Wake.....				1,000
Wayne.....	800	844	1,000	1,250
Wilkes.....	500	500	500	500
Wilson.....	700	700	800	800
Washington.....				850
Yancey.....	300			500
Number Counties coöperating.....	30	33	44	56

lines; employment of year-long Association Rangers under State appointment; and other protective measures.

Following is a list of the associations above mentioned, showing names, rates of assessment, location, etc.

FOREST PROTECTIVE ASSOCIATIONS

Name of Association	Assessment Rate	Location—County	Number Individuals in Association		Acreage Listed	
			1934-35	1935-36	1934-35	1935-36
Elk Creek Association.....	2¢	Watagua, Wilkes, Caldwell.....	1	1	40,000	40,000
South Mountain Association...	1¢	Burke, McDowell Rutherford.....	6	6	38,000	38,000
Moore Protective Association... (Minimum dues \$5).	2¢	Moore.....	14	14	14,000	14,000
Scotland County Association...	2¢	Scotland.....	14	5	32,000	17,000
Serpell Protective Association...	2¢	Carteret.....	1	1	6,600	6,600
State College Association.....	2¢	Onslow, Jones.....	-----	1	-----	84,000
Eureka Lumber Co. Association	1¢	Beaufort.....	-----	1	-----	8,000
East Carolina Land Association	2¢	Beaufort.....	-----	1	-----	20,000
Camp Mfg. Company.....	1¢	Bertie.....	1	1	20,000	20,000
Camp Mfg. Company.....	1¢	Hertford-Gates....	1	1	25,000	25,000
Overhills Protective Association	1¢	Harnett, Hoke, Cumberland....	3	3	39,000	36,000
Butters Association.....	2¢	Robeson.....	1	1	30,000	30,000
Cooper River Timber Co.	3¢	Pender.....	1	1	10,000	10,000
Orton Protective Association...	2¢	Brunswick.....	15	19	34,000	36,000
J. L. Sprunt Association.....	7.5¢	Brunswick.....	-----	1	-----	15,000
Waccamaw Protective Ass'n....	3¢	Columbus-Bladen..	4	20	31,000	35,000
Total.....	-----	-----	62	77	319,600	434,600

Fire Control Improvements: During this biennium, the State and coöperators have been called upon to bear only a small portion of the fire control improvements during this period. The major portion of all improvements consists of lookout towers, tower houses, trailer sheds, telephone lines, roads, trails, and fire breaks, having been constructed with CCC labor under the direction of the Emergency Conservation Work, which agency bore all costs of material.

In the list of towers made a part of this report, it will be noted that, with one exception, all of the towers listed as having been constructed during this period were built from ECW funds by CCC labor. In the case of this one exception, only the cost of the tower itself was borne by State coöperative funds, all erection costs being paid by ECW.

Seven other towers have been purchased and are on the ground for erection. These will be included in the next biennial report.

THE FOLLOWING TOWERS HAVE BEEN PURCHASED BY ECW AND
ERECTED THIS BIENNIUM

Name	Height	County	Date	Built By	Tower Costs*	Tower House Number Rooms
Greens Cross----	99'9"	Bertie-----	Aug. 1934--	ECW	\$1,255.54	2-room
Liles-----	79'6"	Halifax-----	July 1934--	ECW	1,086.82	2-room
Mamers-----	72'9"	Harnett-----	Sept. 1934--	ECW	990.63	2-room
Southern Pines--	72'9"	Moore-----	July 1934--	ECW	991.47	4-room
Tryon Mountain.	45'9"	Polk-----	July 1934--	ECW	873.35	1-room cabin
Rendezvous Mountain-----	59'3"	Wilkes-----	Oct. 1934--	ECW	823.68	
Dudley-----	99'9"	Wayne-----	Sept. 1934--	ECW	1,745.66	2-room
Wilson-----	99'9"	Wilson-----	Sept. 1934--	ECW	1,422.87	2-room
Toxaway-----	45'9"	Transylvania..	Oct. 1935--	ECW	889.19	1-room cabin
High Windy-----	45'9"	Buncombe-----	Sept. 1934--	ECW	968.90	1-room cabin
Roaring Gap-----	59'3"	Alleghany-----	June 1935--	ECW	963.05	1-room cabin
Shallotte-----	99'9"	Brunswick-----	Feb. 1935--	ECW	2,122.57	2-room
Maco-----	99'9"	Brunswick-----	Dec. 1935--	ECW	1,697.82	
Jones Lake-----	99'9"	Bladen-----	Jan. 1935--	ECW	1,531.97	2-room
East Robeson-----	99'9"	Robeson-----	Feb. 1935--	ECW	1,714.68	2-room
Swift Creek-----	79'6"	Nash-----	Mar. 1935--	ECW	1,221.33	2-room
Wilmar-----	99'9"	Craven-----	Feb. 1935--	ECW	2,149.35	5-room
Newkirk-----	99'9"	Sampson-----	Nov. 1935--	ECW	1,423.86	
Everetts-----	99'9"	Beaufort-----	Dec. 1935--	ECW	1,410.06	2-room
Rose Hill-----	99'9"	Duplin-----	Nov. 1935--	ECW	1,630.04	
Comfort-----	99'9"	Jones-----	Dec. 1935--	ECW	2,001.33	
Young-----	99'9"	Johnston-----	Nov. 1935--	ECW	1,095.37	
Earp†-----	102'	Johnston-----	Dec. 1935--	ECW	894.00	
Ward's Corner...	120'	Pender-----	April 1936--	ECW	2,088.00	
Chinquapin-----	99'9"	Duplin-----	May 1936--	ECW	1,877.93	
Plymouth-----	99'9"	Washington....	April 1936--	ECW	1,770.21	
Foreman-----	99'9"	Martin-----	April 1936--	ECW	1,978.36	5-room

*Includes cost of tower, freight, labor and other materials used in construction.

†This tower was purchased by a coöperator, and erected by ECW (State costs were \$45 and ECW costs were \$349).

In addition to the above, ECW purchased and constructed the following tower houses at other tower sites:

Table Rock, Burke County.....1-room cabin
Bolivia, Brunswick County, June, 1935.....5-room

The above towers, as noted, represent a total investment of \$38,073, all of which was provided by the ECW program during this biennium at no cost to the State or Counties. Furthermore, the cost of the tower houses is not included in that figure (these houses represent an investment of about \$18,250, also without cost to the State or Counties).

Including the above towers and tower houses, the State has 73 towers used solely for forest fire detection. The Department's plan for fire control over the entire State calls for a final system of 123 such towers, their location being so arranged as to give complete coverage to all forest areas needing such protection, and to fit into the existing tower systems of the U. S. Forest Service and National Park Service.

Telephone Lines: To make the fullest use of the towers in the detection system, telephone lines connecting these towers with each other in series, are necessary. Telephones in the homes of wardens living upon such lines and the County Wardens connected with the towers in the counties are also needed. During the past two years there have been constructed approximately 370 miles of telephone line. All construction work has been done by ECW, and with the exception of approximately 18 miles of wire purchased from State funds, all material has been supplied by ECW. In the main the lines are metallic circuits. Therefore, the 370 miles of telephone line represent approximately 740 miles of wire. Meagre available funds would not have permitted the construction of this mileage of telephone line from State and coöperator's funds; and we are, therefore, greatly indebted to ECW for this much needed improvement.

TELEPHONE LINES CONSTRUCTED THIS BIENNIUM

Name of Line	Length Miles	County	Year Built	Built By	Type
Tuscarora Tower Line.....	1	Craven.....	1934	NCFS	Met.
Rhems Line.....	5	Craven.....	1934	NCFS	Met.
Bearwallow-Fairview.....	6	Buncombe.....	1934	ECW	Met.
Bearwallow-Edneyville.....	9	Henderson.....	1934	ECW	Met.
Chambers Mountain-Clyde.....	3	Haywood.....	1934	ECW	Met.
High Windy-Blue Ridge.....	3	Buncombe.....	1934	ECW	Met.
Tryon Mountain Highway No. 19.....	5½	Polk.....	1934	ECW	Met.
Warden Smart-Rutherfordton.....	8½	Rutherford.....	1934	ECW	Ground
Biggerstaff-Pinnacle System Connection.....	7	Rutherford.....	1934	ECW	Ground
Biggerstaff Tower-Melton-Warden Owens.....	25	Rutherford.....	1934	ECW	Ground
Biggerstaff System-Dave Smith.....	2¾	Rutherford.....	1934	ECW	Ground
Hawshaw Tower-Vance-Newland.....	4	Avery.....	1934	ECW	Met.
Rendezvous Tower-Warden Nichols.....	3	Wilkes.....	1934	ECW	Met.
Table Rock System-Morganton.....	15	Burke.....	1934	ECW	Ground
Warden Wise-Warden Dellinger.....	2	Burke.....	1934	ECW	Ground
Table Rock Lookout-Warden Beck..... (Relocating and rebuilding)	7½	Burke.....	1934	ECW	Ground
Hibriten Tower-Lenoir.....	4	Caldwell.....	1934	ECW	Met.
Rendezvous Tower-Stamper's.....	16	Wilkes.....	1934	ECW	Ground
McCormick's-Linden Line.....	13	Harnett.....	1934	ECW	Met.
Scotland Tower-Hoffman Laurinburg Line.....	1	Richmond.....	1934	ECW	Met.
Mamers Tower-Lillington.....	9	Harnett.....	1934	ECW	Met.
Sassafras Tower-Rosman.....	9	Transylvania.....	1935	ECW	Met.
Horse Ridge Tower-Dave Smith.....	7.5	Burke.....	1935	ECW	Met.
Roaring Gap Tower-Highway.....	0.6	Alleghany.....	1935	ECW	Met.
Dudley Tower Line.....	5½	Wayne.....	1935	ECW	Met.
Wilmar Tower Line.....	9	Craven.....	1935	ECW	Met.
Woolard's to Washington.....	2.4	Beaufort.....	1935	ECW	Met.
Swift Creek Tower Line.....	1	Nash.....	1935	ECW	Met.
Lillington to Ray's.....	9.7	Scotland.....	1935	ECW	Met.
Highway 15A to McLean's.....	1	Scotland.....	1935	ECW	Met.
Jones Lake Tower-Sutton's Store.....	4	Bladen.....	1935	ECW	Met.
Palestine Tower-Fayetteville.....	4.5	Cumberland.....	1935	ECW	Met.
Palestine Line to McLean's.....	0.9	Harnett.....	1935	ECW	Met.
Mamers-Lillington-Ray Spur Lines.....	1.3	Harnett.....	1935	ECW	Met.
Shallotte Tower-Dawson Jones.....	35.1	Brunswick.....	1935	ECW	Met.
Orton Tower-Reed's.....	12.2	Brunswick.....	1935	ECW	Met.
Highway 17 to Johnson's.....	3.5	Brunswick.....	1935	ECW	Met.

TELEPHONE LINES CONSTRUCTED THIS BIENNIUM—*Continued*

Name of Line	Length Miles	County	Year Built	Built By	Type
Highway 17 to Coleman's.....	1.4	Brunswick.....	1935	ECW	Met.
Funston Road to Earp's.....	0.1	Brunswick.....	1935	ECW	Met.
Reed's to Foulke's.....	3.0	Brunswick.....	1935	ECW	Met.
Rockingham-County Warden.....	2.0	Richmond.....	1935	ECW	Met.
Rougemont-Mount Tirzah Tower.....	5.0	Durham-Person..	1935	ECW	Met.
Scotland Neck to Scotland Neck Tower....	4.4	Halifax.....	1935	ECW	Met.
Liles Tower-Littleton.....	7.6	Halifax.....	1935	ECW	Met.
Northampton Tower-Jackson.....	4.7	Northampton....	1935	ECW	Met.
Scotland Co.-York Spur.....	0.8	Scotland.....	1936	NCFS	Met.
Scotland Co.-Bostic.....	1.5	Scotland.....	1936	NCFS	Met.
Anson Co. Line No. 1.....	6.0	Anson.....	1936	NCFS	Met.
Montgomery Co.-O. D. Smith Spur.....	4.0	Montgomery....	1936	NCFS	Met.
Southern Pines-Southern Pines Tower.....	$\frac{1}{3}$	Moore.....	1936	ECW	Met.
Aberdeen-Carthage Line to Ferguson's....	$1\frac{1}{2}$	Moore.....	1936	ECW	Met.
Laurel Hill-Ralph Curries'.....	7.3	Scotland.....	1936	ECW	Met.
Highway No. 15 to Barber's.....	3	Scotland.....	1936	ECW	Met.
Highway No. 15 to Monroe's.....	2	Scotland.....	1936	ECW	Met.
Laurinburg to Ellerbe.....	52	Scotland.....	1936	ECW	Met.
Clarkton to McQueen's.....	3.0	Bladen.....	1936	ECW	Met.
East Robeson Tower-Lumberton.....	8.2	Robeson.....	1936	ECW	Met.
Fayetteville to Cedar Creek Tower and Green Bros. Lumber Co.....	16.8	Cumberland....	1936	ECW	Met.
Toxaway Tower-Fairfield.....	5.2	Jackson.....	1936	ECW	Met.
Toxaway Tower-Lake Toxaway.....	9.3	Transylvania....	1936	ECW	Met.

The above 406.5 miles of telephone line, at an average cost of \$200 per mile, represent an investment of about \$81,900. About \$80,000 of this was borne by ECW at no cost to the State or Counties.

Truck Trails: On June 30, 1936, there had been constructed a total of 1,053 miles truck trails by the Emergency Conservation Work. Of this mileage, 600 miles were built during the biennium. These roads are used for accessibility, for fire fighting purposes, into previously inaccessible areas, and have proven of material assistance in allowing the organization to reach fires with the least possible delay, thereby reducing the area burned. They are low grade roads and not highways—constructed for fire control purposes only. They also act as fire breaks and back-fire lines when back-fires are necessary.

Fire Lines: Approximately 800 miles of fire lines have been constructed; and about 500 miles of this line were built by ECW and consisted of plowed lines ranging from six to nine feet in width, used as fire breaks and as back-fire lines. On one association area, embracing some 15,000 acres of land, approximately 300 miles of six-foot plowed furrows were constructed from State coöperative funds as added protection against fire. Several hundred miles of fire line have been maintained annually on coöperating units by the State by re-plowing old lines and burning between lines and roads.

Tower Houses: Up to June 30, 1936, ECW had constructed 24 trailer sheds, ten one-room cabins, two five-room towermen's houses at as many towers; also one large lookout cabin used as a tower itself. In addition to these the State had previously put up from coöperative funds seven tower houses at as many towers. These buildings are of three classes: five-room bungalows, two-room buildings, one room for living quarters and one a garage for the storage of the fire-fighting trailers and other fire-fighting equipment; and one-room cabins for the accommodation of the towermen at the towers in the mountains of the two western districts. Nearly all are accessible by road, and all are connected with telephone to wardens or commercial exchanges.

In securing tower sites in the Eastern Districts we are requesting one-acre tracts, preferably deeded to the State. Sites including 24 acres of land are State property and long-time leases cover an additional 18 acres. Where no deeds can be secured, from 39 to 99-year leases are given us. Where it is deemed advisable year-long towermen are being employed at a small wage and furnished with a house, a garden site and a small place for keeping poultry and a cow. The full-time of these employees is required during the fire season but it is stipulated in their appointment that during the off-fire season, or during the period when their services are not required on lookout duty, they are at liberty to engage in any other activity, providing they retain a residence at the tower and are available at all times for call when needed. By this means vandalism at these tower sites is prevented; a trained and satisfactory detection organization is retained; these towermen are subject to call at any time their services are needed. In the case of towers in the Mountain Districts, sites are obtained either by lease or deed, and are generally one-fourth to one-half acre in size. Since fires in the mountains are usually definitely seasonal, the towerman is not needed the entire year, garden sites at the towers are not practical, and hence the larger sites are not required. The tower houses which ECW has constructed range in value from \$1,500 for the five-room bungalows to \$350 each for the cabins at the mountain towers. A list of these tower houses will be found in Table 9 on page 41.

Fire-Fighting Equipment: After having experimented with all approved forest fire-fighting equipment in use in the South over a period of years we have selected a limited list of equipment that has been found most satisfactory for the needs in this State. Prime among this equipment is a five-gallon back-pack spray pump, manufactured by the D. B. Smith Company. We standardized on a specially constructed fire rake made with mowing machine teeth instead of the regular rake tooth. This is manufactured by the Council Tool Company of Wananish. A special brush hook manufactured in a manner to permit of its use as a light axe as well as a brush hook is also used. This is also made by the Council Tool Company. We use an 18-inch by 24-inch swatter made from a piece of belting of this size properly attached to a straight handle for beating out fires. In addition to the above standard equipment we use single-bit axes, long-handled shovels, railroad fusees for back-firing purposes, five-gallon back-pack water supply tanks for filling the fire pumps, ordinary galvanized water

buckets, and lanterns in night work. Some use is made of cross-cut saws and, in the mountains, of double-bit axes. Gasoline-operated portable power pumps are being considered as standard equipment, as far as limited funds will permit. A list of equipment follows:

LIST OF PRINCIPAL ITEMS OF FIRE-FIGHTING EQUIPMENT

	Purchased During Biennium	Total on Hand Date of This Report
Automobiles.....	37	38
Axes.....	66	100
Water buckets.....	379	492
Bush axes.....	265	709
Swatters.....	444	628
Lanterns.....	65	69
Knapsack pumps.....	1,275	2,864
Fire rakes.....	1,789	5,137
Shovels.....	16	66
Back-fire torches.....	1	21

A majority of the 34 half-ton trucks in service are equipped with 75-gallon water tanks and motor-driven centrifugal pumps for filling and discharging the tanks under pressure with sufficient hose for use while the truck is moving or for carrying out lines of hose on fire. Each truck is equipped with sufficient fire-fighting equipment and carrying capacity for ten fire fighters.

In addition to the above there are in operation 60 two-wheel fire-fighting trailers which are attached to the rear of wardens' cars. They are supplied with a 55-gallon reserve water tank, sufficient tools and equipment for ten men.

We have purchased during this biennium for use on association areas, two light caterpillar tractors, two 3-disc fire line plows, one road machine, one heavy tractor disc harrow; and there have also been secured, at a small cost, several discarded motors and chassis of county school busses which are being worked over into fire-fighting trucks to be stationed at towers.

Forest Fire Statistics: In spite of the fact that beginning July 1, 1934, approximately 4,000,000 acres of additional timbered area were brought under protection, the number of fires was reduced from 1,700 in the spring of 1934 to 251 in the fall of that year and the total area burned from 169,000 acres in the spring to 13,000 acres in the fall. The average area burned per fire was also materially reduced along with the total cost per fire, which was reduced better than half from the spring season. The spring of 1935 was what would be considered a normal spring fire season and the fall of this year again represented a reduction of the number of fires from the spring season. The area under protection was increased to approximately 14,000,000 acres during this biennium.

The spring of 1936, however, represented one of the worst fire seasons

in the history of the Forest Service. The field organization functioned perfectly. There were ample equipment and funds for operation during the period of a normal fire season but fires gradually increased, causing a very serious situation in May and June. Where there were 1,700 fires in the spring of 1935 there were 3,405 during the spring months of 1936; and where \$43,000 was spent in handling these 1,700 fires, \$92,607 was expended in handling the fires in the spring of 1936. This abnormal condition, coming after the normal closing date of a spring season, completely absorbed all of the remaining funds and caused a deficit. In spite of the outlay and the increased number of fires, we were able to hold the average cost down to \$3.55 per fire.

Two conditions are responsible for this large number of fires.

First, there was a larger area under protection by almost 5,000,000 acres, or one-third. However, there was in the field a larger organization, a better detection system, a better reporting system and a better trained organization. The result was that more fires were discovered, reported, and worked upon than would have been possible with a smaller and less efficient organization.

Second, the drought condition that existed, particularly through the Coastal Plains section, was responsible for many fires getting out of control and the dried-out condition in the bays and pocosins caused these fires to burn more persistently. This materially increased suppression costs. The late spring, preventing farmers from starting farming operations at the ordinary time, caused a widespread outburst of fires from brush-burning and other agricultural activities as farmers were enabled to get into the woodlots and fields at a time when the climatic conditions were most favorable for burning and when fires spread most rapidly.

Ordinarily the middle of May sees the spring fire season virtually over, but May and June of this year represented the worst season in the past fifteen years. The entire field force was taxed to the limit and had it not been for the organization functioning in many of the counties in the Coastal Plains section, it is common knowledge that the greater portion of the timberlands in some counties would have been completely destroyed.

Fires burned for a period of a month or two in many instances; crews worked on them continuously day and night but due to the nature of the inflammable material it was impossible to extinguish them completely. At the close of June a very serious condition continued and fires were burning in many counties in the Coastal Plains where normally such areas would be under several inches of water.

The following table shows the forest fire statistics for the protected areas for the past four years.

FOREST FIRE STATISTICS FOR PROTECTED AREAS BY FISCAL YEARS

	1932-33	1933-34	1934-35	1935-36
Area Under Protection—Acres.....	5,804,343	6,405,975	9,862,289	13,634,000
Number of Fires by Classes:				
A—Under ¼ acre.....	40	29	54	206
B—¼ to 10 acres.....	498	882	901	1,953
C—10 to 100 acres.....	720	1,386	903	1,540
D—101 to 500 acres.....	106	371	159	283
E—Over 500 acres.....	15	78	16	64
Total.....	1,379	2,746	2,033	4,046
Causes of Fires:				
Brush Burning.....	227	371	495	758
Hunters, Fishermen, Campers.....	131	694	195	384
Railroads.....	47	52	29	98
Lumbering.....	16	65	35	112
Incendiary.....	362	427	396	872
Smokers.....	333	652	632	1,265
Lightning.....	8	10	7	26
Miscellaneous.....	130	234	150	414
Unknown.....	125	241	94	117
Total.....	1,379	2,746	2,033	4,046
Area Burned—Acres:				
Merchantable Timber.....	14,263	82,170	23,442	48,597
Reproduction.....	47,599	157,132	57,186	129,487
Open Grass Land.....	6,671	19,075	15,443	64,125
Total.....	68,533	258,377	96,071	242,209
Average Area Per Fire, Acres.....	50	94	47	60
Per Cent of Protected Area Burned.....	1.2%	4.0%	0.9%	1.8%
Damage:				
Merchantable Timber.....	\$ 32,031	\$ 214,863	\$ 50,055	\$ 111,649
Reproduction.....	82,607	290,825	122,292	251,549
Other.....	14,836	54,717	19,979	26,656
Total.....	\$ 129,474	\$ 560,405	\$ 192,326	\$ 389,854
Average Damage Per Fire.....	\$ 94	\$ 204	\$ 95	\$ 96
Total Fire Fighting Costs.....	8,479	22,509	7,566	15,388
Average Fire Fighting Costs Per Fire.....	6.15	8.20	3.72	3.80
Law Enforcement:				
Number of Prosecutions.....	52	57	56	110
Number of Convictions.....	33	44	45	85
Fines and Costs.....	\$ 545	\$ 666	\$ 566	\$ 878
Responsible Parties Apprehended:				
Number of Parties Billed.....	144	184	149	252
Number Making Payment.....	92	89	112	194
Amount Received.....	\$ 419	\$ 519	\$ 524	\$ 997

FOREST FIRE STATISTICS FOR PROTECTED AREAS BY FISCAL YEARS—*Continued*

	1932-33	1933-34	1934-35	1935-36
Cost Paid by Landowners:				
Number of Parties Billed.....	4	0	1	2
Number Making Payment	4	0	1	2
Amount Received.....	\$ 15	\$	\$ 1	\$ 9
Warden Activities:				
Number of Hours Worked.....	55,724	80,279	98,419	227,126
Miles Traveled—Car, Foot, Horse.....	129,883	195,075	247,897	523,694
Number of Notices Posted.....	2,443	1,126	2,308	3,610
Number of People Interviewed.....	33,190	29,037	64,647	103,150
Number of Sawmills Inspected.....	259	287	624	933
Number of Schools and Meetings Visited..	671	277	434	473

COMPARISON OF PROTECTED AND UNPROTECTED AREAS

	Area Protected by State	Area Unprotected	Total Needing State Protection
Forest Lands in North Carolina—Acres:			
1934 Calendar Year.....	10,053,950	10,514,050	20,568,000
1935 Calendar Year.....	13,634,000	6,934,000	20,568,000
Number of Fires Reported:			
1934 Calendar Year.....	2,034	604	2,638
1935 Calendar Year.....	2,423	461	2,884
Area Burned—Acres:			
1934 Calendar Year.....	182,250	632,687	814,937
1935 Calendar Year.....	115,733	357,569	473,302
Per Cent of Total Forest Area Burned:			
1934 Calendar Year.....	1.81%	6.02%	3.47%
1935 Calendar Year.....	0.85%	5.16%	2.30%
Damage:			
1934 Calendar Year.....	\$ 370,389	\$1,417,792	\$1,788,181
1935 Calendar Year.....	198,611	618,588	817,199

The above figures do not include 978,000 acres of National Forest and Park lands, Indian lands and the Fort Bragg Military Reservation protected directly by the Federal Government, as of 6-30-36.

County Fire Control Activities: The usual number of wardens' meetings was held throughout the different districts, at which time the wardens were coached in fire control methods and plans laid for the following fire seasons.

In October of 1934, a conference of the District Foresters and District Rangers of the State Forest Service, together with the Director and Camp Superintendents of the ECW, was held. At this meeting a definite understanding, in writing, was prepared as to the responsibility in fire control of the District Foresters, District Rangers, County Wardens and the Project Superintendent of ECW. This meeting was primarily to have a

clearer understanding among all concerned as to the division of responsibility in order that no misunderstanding might occur. The result of this meeting has been very satisfactory.

A conference of District Foresters and District Rangers was called in June, 1935, and assembled at the Mount Mitchell Game Refuge, where a week was spent in setting up standards for work and inter-district problems discussed. Representatives of the U. S. Forest Service were present at this meeting and coöperation between the State and Federal Forest Service was discussed and a program mapped out. At this meeting special stress was laid on the necessity of law enforcement and the proper procedure in such.

Conclusion: At the beginning of this biennium it became clearly evident that if we were to provide adequate fire protection in and upon coöperating units, changes in policy were necessary. Prime among such was the need of having County Wardens devote their entire time to their work and in order to do this it was necessary to pay them a wage that would permit of such. Consequently, the salaries of the County Wardens were increased to the point where their entire time could be demanded. In order to accomplish this in some counties it was necessary to have the appropriation increased sufficiently to care for such increase in salary. The counties responded favorably. This enabled us to obtain satisfactory County Wardens who are now devoting their entire time to the work. These Wardens are paid salaries ranging from \$60 to \$150 per month, the average being around \$100.

The old idea of having Deputy Wardens distributed promiscuously throughout the counties was done away with. They were not efficient, with the result that we unnecessarily lost acreage. These Deputy Wardens have been largely replaced with organized fire crews distributed where needed and paid a small monthly wage during such periods. The crews remain at a tower under the direction of a District Warden subject to fire call day and night. Regardless of how much fire-fighting time they put in, their wage remains the same; and the sooner the fire is out the sooner they are able to rest. This automatically reduces the area burned as they are not paid by the hour and, therefore, have no interest in working any longer than is absolutely necessary.

Year-long towermen, stationed at the towers, give us not only better detection, but stabilize the organization.

In order to prevent a breakdown in the morale of the warden organization and seasonal employees, CCC crews are only called upon where it is fully determined that the regular warden organization cannot handle a fire because of its size, etc.

Equipment of County Wardens with fire-fighting trucks, fully equipped, has been another factor in improving the work. The erection of numerous additional towers and the tying-in of these towers with telephones have contributed materially to quick detection and the prevention of lost motion in fire control.

There is a very noted improvement in the attitude of the average citizen toward fire control over that which existed a few years ago. The residents of the State are becoming more "Forest Minded." It is much more easy

to secure heavy fines and even road sentences for fire law violations than it was in the past, indicating that the courts are back of the work.

The re-districting of the State to bring under one supervisory head similar timber types and climatic and geographical conditions has enabled us to build up by forest districts a more perfect organization; and through the retention of supervisory personnel familiar with conditions in their district noticeable progress has been made.

It is our aim eventually to make each and every coöperating county a fire control unit within itself wherein each County Warden will concentrate his efforts toward fire control in a manner that will carry to the residents of that county the necessity of each and every individual assuming a personal responsibility for not only the protection of his own lands from fire, but also the lands of his neighbors.

No extensive use of a forestry educational program has been made during this biennium. This was partly due to a lack of funds, but chiefly to the fact that this educational work is best presented through personal contact with individuals rather than mass approach as is done in the case of lectures, motion pictures, etc.

The press of the State has coöperated 100 per cent in carrying the message to the news-reading public. The members of the last legislature, we feel, had a far better knowledge of the problems of fire control than has been evidenced in the past and it was through their knowledge of the needs of this department that we were able to secure additional funds and passage of the law that was so beneficial in blocking up the work within the State.

STATE FOREST NURSERY

Ten years' experience in operating the State Forest Nursery on a minimum appropriation has brought out a number of requirements which seem to be essential to successful operation, which means sufficient economical production of suitable tree species to restore, as soon as practicable, profitable forest growth to North Carolina's eroded and devastated idle land, both privately and publicly owned.

The object of the State Forest Nursery, therefore, is the production economically of such forest planting stock as may be annually required by public and private landowners of the State for reforestation of waste and denuded lands. The chief factors in this program are (1) sufficient suitable land for the production of the needed species, (2) competent management and supervision, (3) an adequate supply of labor, seed, fertilizer and equipment, and (4) favorable weather conditions.

Land: With increasing demand for seedlings and the occupation of a still greater amount of the fourteen-acre tract south of the road near Clayton by buildings, there has been insufficient land to afford necessary rotation of crops; and with no opportunity of thus adding humus to the soil, growth of the seedlings has been greatly retarded.

In February, 1935, efforts were renewed to secure additional space at the nursery. The remaining portion of the Pool (Ashley Horne) tract, from which the original purchases were cut off in 1927 and 1930, consisted of

nearly 100 acres north of and across Highway No. 70 from the present site. This tract had become the property of the State Banking Department.

The experiences of the summer of 1935 emphasized the serious need for sufficient space to allow for rotation of crops, so negotiations were renewed in October when this property was offered to the Department for \$3,250 cash. The Budget again declined to allow the \$1,000 item in the next year's budget to be used but suggested a transfer of funds from one of the other divisions of the Department, which proved impracticable. However, in December arrangements were made for the purchase of two-thirds of the tract and a lease under option to purchase for the other one-third, and a deed for 63.2 acres comprising the eastern portion of the tract was executed and turned over to the Department in January, 1936. At the same time a lease with option to purchase before August 1 was entered into and the whole property came under the administration of the Department. Cowpeas were sown on both parts of the addition and black walnut, black locust, mimosa and longleaf were sown in rows, with no water supply in sight. Results with the tree seed were far from satisfactory but the peas promise a good crop of humus. Deed for the remaining one-third, 33.3 acres, on the western side of this area was finally secured in July, 1936. The cost of the land for the nursery property has been as follows:

January, 1928.....	9.28 acres	\$1,200
July, 1931.....	4.9 acres	500
January, 1936.....	62.3 acres	2,000
July, 1936.....	33.3 acres	1,500
	<hr/>	
	109.78 acres	\$5,200
Cost of abstract, fees, etc.....		100
		<hr/>
		\$5,300

This is an average cost per acre for the 110 acres of some \$48, considered a very fair price in view of its frontage on Highway U. S. 70 of some 1120 feet. With its restoration to full fertility this property will steadily increase in value. Already fifteen acres are growing a crop of cowpeas which will greatly improve the quality of the soil. The labor, supplied through the coöperation of the Federal Government, has been adequate to the needs, though the time and effort consumed in transporting men daily from the CCC camp at Manchester has considerably increased the actual cost of production. The establishment of a side camp from that camp, following the removal of the Durham camp, made available a number of men who can put in full time on the nursery and with the additional barracks room now available some fifty men are housed on the nursery property, though not more than half of these can be made available for nursery work. P. W. Allred, ECW foreman, a man with considerable forestry training, has been in charge of the side camp, while Addie Pace has continued to have charge of the State property as nurseryman, resident in the cottage.

Distribution: Weather conditions were normal during the 1934-35 growing season but the winter and spring of 1936, with its wet and severe weather, interfered with and often prevented working the land until the middle of April. Excessive drought following that, has seriously affected

the crop to be distributed next winter. The drain on the one small well by the increased personnel of the camp seriously interfered with the use of water on the seed beds and authorization for an additional supply through ECW, though greatly appreciated, did not come in time to remedy this lack.

TABLE I
DISTRIBUTION OF FOREST TREE SEEDLINGS BY SPECIES, 1932-1936

	1932-33	1933-34	1934-35	1935-36
1. Loblolly Pine.....	93,006	258,392	392,175	2,065,900
2. Shortleaf Pine.....	56,381	61,202	28,725	45,850
3. Longleaf Pine.....	19,790	24,152	57,325	471,913
4. Slash Pine.....	11,331	31,152	30	34,300
5. Black Locust.....	25,400	34,652	510,107	296,065
6. Tulip Poplar.....	22,700	4,621	3,216	118,175
7. Black Walnut.....	8,846	9,445	10,906	9,035
8. Red Gum.....	2,450	6,952		
9. Miscellaneous.....	2,578	5,040	5,985	1,417
10. Mimosa.....			4,325	17,650
11. Maritime Pine.....				11,050
12. Cypress.....				2,110
13. Ash.....			5,650	
Totals.....	242,482	435,608	1,018,444	3,073,465

The table above shows the total number of forest tree seedlings grown in the nursery near Clayton and distributed to farmers and other landowners and agencies for forest planting. Approximate cost price is charged, except to schools and other public agencies, which under certain conditions have been supplied some seedlings free or at reduced prices.

TABLE II
DISTRIBUTION OF FOREST SEEDLINGS BY CLASS OF COÖPERATORS, 1934-1936

Class of Coöperators	Biennium, 1934-36		Total Period, 1926-36	
	Number Coöperators	Number Trees	Number Coöperators	Number Trees
Farmers.....	133	346,720	560	1,307,964
Companies.....	6	92,927	39	280,014
Schools.....	9	137,364	238	547,585
State.....	8	2,526	50	317,632
Boy Scouts.....			30	14,680
4-H Clubs, Home and County Agents.....	43	55,550	2,403	116,621
Municipalities.....	4	21,000	6	105,674
Soil Conservation Service.....		2,032,040		2,032,040
Resettlement Administration.....		793,200		793,200
E. C. W. Dare County.....		71,050		71,050
Fort Story, Virginia.....		39,000		39,000
Illinois.....		500		500
U. S. Forest Service.....		500,040		500,040
Totals.....	203	4,091,917	3,326*	6,126,000

*Many duplications in these.

The above table shows the distribution of seedlings for the two years of the biennium and for the ten-year period since the establishment of a State Forest Nursery. Coöperation with the several Federal agencies interested in reforestation enabled us to place practically all plantable stock. A considerable amount of small stock, which under ordinary conditions would have been discarded, was made use of in this way. The lack of State lands under the care of this Department on which to plant any surplus stock prevented one of the usual ways of disposing of such surplus.

As a slight recognition of the Federal contribution to the operation of the nursery, half a million seedlings were delivered free to the United States Forest Service for planting on the national forest in South Carolina, while reductions were made in the prices to the Resettlement Administration and the Soil Conservation Service.

The Soil Conservation Service was the State's largest customer and although this Federal agency has established three forest tree nurseries in North Carolina, so far these have been unable to supply their own demand. The practice of requiring landowners to purchase seedlings from the Department where more than a small acreage is to be planted by the Soil Conservation Service, has developed. This plan, if adhered to, will encourage State production and will give the landowner an added interest in his plantation.

The Resettlement Administration secured nearly 800,000 seedlings, half of which were planted on their Sandhills and Bladen County projects.

Coöperation with the ECW has secured many improvements to the nursery in addition to the six buildings listed on page 75 of the report of the State Director. A ditch along the south boundary was blasted out in July, 1935, and a power line has been laid from Clayton, which now furnishes light to the side camp and power to the repair garage.

Diseases: The wilt disease which attacked the black locust seedlings in the summer of 1934 proved less threatening the following summer and it has been practically non-existent during the summer of 1936. The white grubs, however, continued as a very serious menace to the pine seedlings through 1935, and no practicable plan was worked out to control them, although the United States Bureau of Entomology has continued its studies of this pest in the North and South Carolina State Forest Nurseries. It is, therefore, surprising that during the early summer of 1936 practically no grub injury has been experienced. The longleaf seedlings, most of which were sown in rows, have suffered destructively from drought and subsequent beating rains which covered the central buds with sand.

At the request of the Southern Forest Experiment Station seed supplied by that Station was sown in a "study of seed sources", but the lateness of the sowing and the drought allowed so few seed to come up that the results are worthless.

The important effect the weather has had on the nursery in 1936, suggested the advisability of securing some actual data on rainfall. Request was made of the United States Weather Bureau for a rain gauge and Lee A. Denson, Director at Raleigh, installed a rain gauge June 25, 1936, so that records on rainfall observed by the nurseryman will now form part of our planting records.

STATE PARKS

In the establishment of a well ordered system of State Parks several important factors must be given due consideration. One of the primary reasons for establishing State Parks is the preservation of areas of outstanding natural beauty or interest. It follows then that areas to be eligible for consideration as State Parks must have natural beauty or interest of sufficiently high standard to attract not only people in the immediate vicinity of the area but people from distant parts of the State. Unless an area has such quality of natural beauty, it has not the status of a State Park and if established as such, will sooner or later become merely a county or rural municipal park.

But, while people go to State Parks for the enjoyment of natural beauty, they also go for recreation; and, as a general rule, in establishing State Parks in a state where very few if any State Parks exist, the physical ability of the area to lend itself to the provision of various types of recreation, such as swimming, boating, hiking, camping, picnicking and similar activities, must be given careful consideration. People want and need outdoor recreation of the type provided by State Parks and it would be unwise, indeed, to overlook or fail to place sufficient importance on this factor. The parks should not be too far removed from large urban centers of population. In *beginning* a State Park system, these three basic considerations must be kept firmly in mind: (1) Natural beauty or interest; (2) recreational possibilities; (3) geographical location.

A complete State Park system would probably contain a variety of areas. The various types and the number of each would depend, among other things, upon the scenic beauties of the State as a whole; the recreational facilities available from such other sources as National Parks, National Forests, State Forests, County and Municipal Parks, State Parks in adjoining states, private recreational areas, as well as the present population of the State and its probable rate of increase. Some of the various types of State Parks (or Recreational Areas) are: 1. State Parks established primarily because they have sufficient natural beauty and recreational possibilities. 2. State Parks established because they have unusual natural beauty and are established for its preservation. 3. State Parks established because they have sufficient historic or scientific value to be of State-wide interest. 4. State Parks established to preserve typical natural scenery and to afford recreation to large centers of population. These types are listed in the order in which *at present* it seems wise to set them up, taking into consideration the physical aspects and the population of North Carolina. It is much less important to establish State Parks solely for recreation (especially since the creation of parks for the purpose is, or should be, in part by municipalities and counties) than to select those areas which have both natural beauty and recreational possibilities. It is likewise important to preserve for all time areas of great natural beauty and inspiring scenery, even if they are very simply developed and provide mainly for passive recreation and the enjoyment of nature. In establishing State Parks it is important that the desired areas be secured as soon as possible even if they are held undeveloped for years. It was, for instance, more costly and difficult to secure Mount Mitchell in 1915 than it would have

been twenty-five years earlier and it will be much more costly and difficult to secure State Park areas twenty-five years hence than it is now.

The average person wants to know what can be done at State Parks, what general or special interest have they for the public? The State Parks so far established in North Carolina (with the possible exception of Fort Macon which is primarily historical in interest) are of the class which combines natural beauty with opportunity for outdoor recreation. At these State Parks, when the work is completed, it will be possible to enjoy such types of active recreation as swimming, camping, picnicking, hiking, horse-back riding and the like. It will be possible to stay for a week or two in cabins and other housing accommodations. Provisions for nature study and for the study of conservation will be made. It will be possible simply to enjoy passively the beauties of nature.

In the development of the present State Parks in North Carolina the National Park Service has coöperated with the Department and to this agency is due the appreciation of the Department. Appreciation is especially due L. A. Sharpe, assigned to this State as Inspector by the National Park Service. His untiring efforts are in large measure responsible for the establishment of Hanging Rock, Morrow Mountain, and Cape Hatteras State Parks and he has been most active and helpful in initiating and carrying on this development both before and since the appointment of Thomas W. Morse as assistant in general charge of the State Parks.

Fort Macon State Park: The development of Fort Macon State Park was carried on with a CCC camp under the joint direction of the Department and the National Park Service from April 19, 1934, until October 1, 1935. During this time much work has been completed on the area, so that this very interesting State Park is now accessible by road as well as by water.

An approach road from the Atlantic Beach road to Fort Macon has been built and although this road provides access to the park in most weather, paving would much improve it. Negotiations are under way with the Highway Commission for getting this road paved.

The fort itself has been partially restored so that the rooms now provide examples of the conditions of the fort as it was in the various stages of its history. This work of restoration was carefully and painstakingly carried on under the direction of Walter D. Toy, architect, more recently attached to the Hanging Rock Camp, and every detail of construction was authenticated before it was begun. The result is that the work, beyond question, is authentic and definitely tells the story of this magnificent structure.

The caretaker's house has been built, Nicoll Cottage has been repaired and remodeled, and is furnished and offered for rent. Both of these buildings have running water and bath rooms. A picnic shelter, which during the summer of 1936 was frequently used, has been provided. Sanitary toilets for men and for women have been built adjacent to this picnic shelter as well as to the fort. To serve the Nicoll Cottage, the caretaker's house and the toilets, a water supply and a system of sanitary sewage disposal were installed. A dock has been built for the convenience of those who wish to visit the park by water. Besides the construction of these buildings, a

great deal of planting and other work for sand erosion control has been carried on.

On October 1, 1935, Fort Macon State Park was taken over by the Department for administration and maintenance and Lott W. Humphrey was employed as caretaker. On May 1, 1936, the park was declared officially open by Gov. J. C. B. Ehringhaus at appropriate exercises.

In the course of dredging a channel for the Morehead City Port, considerable material from the Sound has been dumped on the park property between Fort Macon and the Nicoll Cottage. This forms a large, unsightly heap of dirt which at present greatly detracts from the appearance of the cottage and of the park.

If the use which the public has made of Fort Macon State Park is any criterion State Parks will be very popular. During the summer of 1936, it was by no means unusual to have over a thousand visitors at the fort in the course of a week and to have five or six hundred automobiles to enter the park on Sundays. Most of these visitors go to see the Fort, but a number of them use only the picnic shelter.

Mount Mitchell State Park: The physical features of Mount Mitchell State Park, which include Mount Mitchell itself, a virgin spruce and balsam forest, magnificent views and a cool summer climate, provide this area with the essentials for an excellent State Park. While it is at present somewhat remote and difficult to get to, completion of the Blue Ridge Parkway will make it easily accessible and great numbers of people will, no doubt, use it. The Department is making plans for its development with this in mind.

The main obstacle to the occupation of Mount Mitchell by a CCC camp was overcome when agreements for the use of the private toll roads were secured. These agreements allow free use of the two toll roads to personnel of the CCC camp, Department of Conservation and Development, National Park Service, the Army, and to persons having official business in connection with the camp. The Highway Commission has been of great help in securing these agreements and the owners of the toll roads have been very coöperative.

From May 13, 1935, until October 1, 1935, Mount Mitchell was occupied by an advance detachment of thirty CCC enrollees. Lack of housing facilities, water and other essentials, prevented the occupation of this area by a full company during this period. Considerable constructive work was done, however, with this small force. A considerable part of a permanent water supply system for the area, including a reservoir and pipe lines, was built. This water system and the preparation of camp site paved the way for a fuller occupancy during the next summer. Severe winter weather restricts work on this area to the early spring, summer and early fall months.

On May 29, 1936, an advance detachment of twenty-five men arrived at Mount Mitchell. More men were gradually added but on June 30 an average of only about twenty-five men was available for carrying on the work program at Mount Mitchell. With this small detachment of men much valuable fire hazard reduction work has been done with the result that not only has the fire risk been reduced but the appearance of the park has been much improved. The warden, Ed Wilson, besides carrying on his regular

duties, has assisted in the work being carried on by the CCC camp. Sartur Anderson, landscape architect, whose plans for retaining and enhancing the beauty of Hanging Rock and Fort Macon State Parks have meant so much to their development, has acted as Superintendent of the Mount Mitchell camp during both summers.

An Emergency Relief Administration Project was approved for planting seedlings on the park. Under this project, which operated from April 15 through May 3, 1935, 23,250 seedlings (mostly balsams) were planted and 22,266 seedlings were collected on the area and planted in nursery beds. For this work the ERA furnished 1,137 man-hours and the Department paid \$96.25 for meals for the men.

During the summer of 1935 and especially during the early summer of 1936, a marked increase in the number of visitors to Mount Mitchell was noted.

Mount Mitchell State Park, as are all the State Parks, is a wildlife sanctuary. As pointed out in the Fifth Biennial Report the number of bears and other animals killed near Mount Mitchell clearly demonstrates the need for a sanctuary in this region.

Hanging Rock State Park: This State Park, located in Stokes County some twenty miles from Winston-Salem, was made possible through a gift of nearly 3,000 acres donated by public-spirited citizens of Winston-Salem through the Winston-Salem Foundation. The deed for this first tract was executed April 20, 1936. William T. Ritter, Secretary of the Winston-Salem Chamber of Commerce, was very active and most helpful in starting this acquisition program, which is now in the hands of a local committee consisting of the following men: T. J. Byerly, Chairman; R. J. Scott and S. G. Sparger, attorneys representing both Stokes County and the State Park Committee; John J. Taylor, Sheriff of Stokes County, and Paul T. Taylor, large landowners; Dr. C. J. Helseback; and B. P. Bailey, C. E. Davis, Jacob Fulton, John Christian and William Marshall. This committee is planning to acquire and place in State ownership sufficient additional land to allow for the development of the best park of its kind in the State, which should not require more than 7,000 acres, practically all of which will be rough mountain land.

The land included in Hanging Rock State Park lies in an area formerly considered by the United States Forest Service for a National Forest. Included in this territory there was a large amount of farm land, and the high prices forced the Forest Service to abandon it for National Forest purposes. The surveys, records and aerial photographs which were made of land in and adjacent to the park have been very kindly turned over to the Department by the Forest Service. These have been of great help in the surveying work which is being done incidental to the acquisition and development of the park.

On July 2, 1935, an advance detachment of the CCC arrived under the superintendence of Frank P. Shore, who had done such good work at Fort Macon; and the program was well under way when the last crew came in from that seashore camp October 1. Mr. Shore and his engineer-foreman, H. B. Shaw, Jr., have both been recommended for promotion in the National Park Service and it is feared the North Carolina park program will soon

lose the support and direction of these two competent public servants. Up to the present time one mile of entrance road involving extremely difficult and heavy construction has been graded. Work on the construction of a concrete dam and of the earth dam has begun. These dams will impound a lake of about twenty acres which will provide boating and swimming facilities for a large number of people. A telephone line 3.2 miles in length was built, and fire hazard reduction work carried on. Rock also has been crushed for road surfacing and for dam construction.

Morrow Mountain State Park: This State Park is in the Uharrie Mountains on the Pee Dee River, seven miles east of Albemarle in Stanly County. Its 2,600 acres include several of the Uharrie Hills. Morrow Mountain, from which the area derives its name, Tater Top and Sugar Loaf are among them. This area has many of the characteristics a State Park should have; it possesses high scenic values and natural beauty. It is close to a large population, and has sufficient acreage to allow development for intensive use and still allow the largest part of the acreage to be preserved and protected for its natural beauty.

This park was made possible through the liberality and public spirit of J. M. Morrow of Albemarle, who made the initial gift of 700 acres, and whose continued interest in the work of development is unflagging. He and J. A. Groves, A. F. Biles and E. E. Snuggs, who also donated some land, and the other members of a very active local committee were instrumental in securing the enactment of Chapter 213, Public-Local Laws of 1935, authorizing Stanly County through its Board of Commissioners, to issue \$20,000 in bonds for the purchase of land for parks and providing that lands so purchased be turned over to the State of North Carolina, Department of Conservation and Development. The act also authorized the county to levy a special tax to pay the interest and principal on these bonds. Under this special act the county has purchased and turned over land for this park to the State.

The committee assisting in the establishment of Morrow Mountain State Park was composed of the following members: W. B. Beaver, Chairman; W. E. Smith, T. R. Wolf, E. E. Snuggs, D. L. Crowell, J. M. Morrow, J. A. Groves, J. H. Morrow, Heath Kluttz and Malcolm M. Palmer. This committee has since the beginning taken an active and constructive interest in Morrow Mountain State Park and the Department is much indebted to these men for their work which has made possible the establishment of the park.

This area was occupied by an advance detachment of CCC enrollees on July 8, 1935, and the full company and part of the supervisory personnel was installed on August 20, 1935. The first large projects undertaken were those of fire hazard reduction, which involved the cleaning up of logs and brush after logging and the utilization of dead and down timber. A considerable portion of the area had been lumbered, and several hundred acres had been injured by fire. Several months were spent in this work with the result that the fire hazard has been greatly reduced and the park much improved in appearance.

During the spring of 1936 a windstorm swept through the park, blowing down many pine trees. In order to prevent fires and insect infestation, it

was necessary to remove these down trees. Arrangements were made for a sawmill and the trees were removed and cut into lumber. About one hundred thousand feet of lumber have been secured in this way. In addition to the lumber, shingles have been made and rock has been quarried. These materials will be used in the construction of various buildings and their use in this way will save money that can be used on other projects.

The preparation of a master plan, plans for park roads and for the contact station and caretaker's house are well under way. Much of the surveying work necessary for the development of the area has been completed.

Cape Hatteras (Phipps Memorial) State Park: This State Park is situated in Dare County on the renowned North Carolina Banks and includes in its area Cape Hatteras—that point of land from which extends the treacherous and dangerous Diamond Shoals. Besides some three miles of beach, this area includes a small part of one of the few remaining wooded areas in the entire Banks. The land so far acquired for this very interesting park was secured through the good offices of Frank Stick as a gift from John S. Phipps in memory of his father and the deed for this property was turned over to the State June 17, 1935.

This State Park was occupied by an advance detachment of CCC enrollees on August 12, 1935, and the full company and most of the supervisory personnel were on the area by September 22, 1935. E. J. Byrum was promoted from the Fort Macon camp, where he had acted as foreman, to the superintendency of this camp and his experience in efforts to control wind-blown sand has been most valuable.

The work program at Cape Hatteras includes some attempt at the restoration of natural conditions. Mainly through the activities of man and domestic animals, virtually all of the trees and many of the other types of vegetation have been destroyed with the result that bare sand is exposed to the eroding action of wind and the beach has been made more susceptible to wave action. The restoration of natural conditions has been begun by the erection, along the ocean front, of fences built of brush. These fences by lowering the velocity of the wind, cause sand dunes to form, which by keeping out salt water, allow vegetation to become established. The dunes are planted with sea oats, hair grass and similar species to hold them in place. In some cases double and even triple fences are built. About fifteen miles of these brush fences have so far been erected.

Bare areas are being planted to suitable grass which will afford cover to trees and shrubs. Moving sand dunes are being planted to trees, shrubs and grasses to fix them in place so as to prevent them from moving over and destroying the small woods area left. Forty acres of grasses have been planted.

Although only a short time has elapsed since the first barrier dunes have thus been formed and the first grasses and shrubs planted, indications are that the sand fixation work will be successful. Much of this type of work must be done at Cape Hatteras before buildings and other improvements can be safely started.

Some interesting biological work is being carried on here. Observations of migratory wild fowl and of resident birds are being made, a check list of the plants prepared and an herbarium is being collected. In addition,

specimens of shellfish and other ocean species are being prepared for inclusion in a museum.

State Lakes: Lack of funds for employing wardens, the difficulty of securing sufficient evidence to convict parties of infractions of regulations, and above all, the fact that none of the land surrounding the lakes is owned by the State, continue to be the chief difficulties in the administration of White Lake and Waccamaw Lake. Carrying out the policy of allowing no closed buildings to be built or replaced over the water has resulted in the removal of most of these from the two lakes, thereby eliminating objectionable conditions.

License plates and permits must be secured for boats operating on these lakes, and this provision helps greatly in their administration. M. H. McQueen, County Forest Warden, has acted also as warden at White Lake, and the Game and Fish Warden at Lake Waccamaw acts as Lake Warden there.

Early in 1936 a permit was granted to the town of Lake Waccamaw to construct a large municipal dock and open pavilion, which is now nearing completion as a part of a WPA project for a recreation area for the town. Under the Resettlement Administration, some work on the development of a Negro recreational area was begun on property adjoining Jones Lake; but on account of difficulties in land acquisition this project was suspended. Some work is also being done under the Resettlement Administration at Singletary Lake, where a bathing beach is projected.

At present Singletary, Jones, Salters and Black Lakes in Bladen County and Phelps Lake in Washington and Tyrrell Counties are not being actively administered, since they are comparatively little used. They should, however, be administered so that they will be protected and properly used. Several of them have good recreational possibilities, but no recreational features can be developed until land surrounding them is acquired by the State.

PUBLIC FOREST PROGRAM

Fulmer State Forests: Following the introduction of a bill in the Congress by Representative Fulmer of South Carolina to provide for the acquisition by the Federal Government of forest lands to be administered and gradually acquired by the states as state forests, it was thought advisable to secure State legislation which would give the necessary State approval and machinery to put the Fulmer Bill into effect should it become law. Chapter 430, Public Laws of 1935, provides such consent and machinery authorizing the State to accept gifts or to lease, purchase, or otherwise acquire land suitable for forestry or park purposes and to enter into agreement to pay for such lands, when necessary, solely from the receipts from the sale of products from such lands.

The federal Fulmer Act, H. R. 6914, was finally passed by the Congress August 15, 1935. It authorized an appropriation of \$5,000,000, but no money was made available, since every effort was being made by the Administration to keep from increasing the annual budget. However, looking forward to a regular or special appropriation from the next Congress, the Forest Service has made a preliminary study of lands in this and other

states so that as little delay as possible will be encountered when funds do become available. It is hoped that State Forests may be established under this act in more than one region of this State.

Other Land Legislation: In line with the policy adopted by the General Assembly of 1929, Chapter 282, for future acquisition and administration of land by the State for public forests and parks, the General Assembly of 1935 (Chapter 173) authorized the retention by the State of vacant and unappropriated land and authorized the State Department of Conservation and Development to "enter into agreement with federal or other public and private agencies for exchange of lands in order to bring about the consolidation of publicly-owned forests, parks, game refuges or other recreational areas." Under this provision, the United States Forest Service has made a practice of consulting the Department to ascertain whether the Department desired to acquire or release such lands for inclusion in the national forests.

This same act requires the Secretary of State "to withhold a grant to any and all vacant and unappropriated lands within or near State forests and parks, and such other areas as the Department of Conservation and Development may request to be withheld for dedication to public use as State forests, State parks, game refuges or other recreational areas"; and the Secretary of State shall upon approval by the Governor "issue a grant for said land to such agency as may have the direction and supervision over such publicly-owned forests, parks, game refuges and other recreational areas."

The first acquisition under this measure was a tract of 181 acres of beach and sandhill land in Dare County between the ocean and Currituck Sound. Deed for this property from the Secretary of State was secured to the Department of Conservation and Development in July, 1935. This area, known as Duck Beach, will one day make a valuable unit for public recreation as well as for the protection of wild life. The ECW camp at Manteo made extensive plantations of grass on this area in 1935 and the spring of 1936.

In November, 1935, a deed was secured for 178 acres of land on the west side of Salters Lake in Bladen County. Since this is one of the State Lakes, the acquisition of this tract, which was brought to the attention of the Department by the Resettlement Administration, will some day be valuable as an administration unit. Three other tracts on "The Banks" of Dare County have been surveyed by the ECW engineer and request is being made on the Secretary of State for a deed for each of these areas to be added to the Cape Hatteras State Park. If, however, any one of them should prove to be too remote for practical administration, it is planned to exchange it for an area which can be included in the park.

There has been much public interest in the proposal to establish a national park on "The Banks" of Dare County; and the General Assembly of 1935 provided in Chapter 332 for the donation to the Federal Government of any lands belonging to the State within the proposed park area in case of the establishment of such a park. In view of this, the recreational use of such State lands by the public will, of course, be continued should the national park be established.

Another law which strengthens the position of the State in the disposal and management of its own lands is Chapter 342, Public Laws of 1935. This act allows the withdrawal from sale of certain swamp and marsh lands when it has been determined that such lands are more valuable for public than for private use. The State Board of Education, owner of such lands, may under this law reserve from sale and arrange for administration of areas suitable for oyster culture, for game refuges or other purposes consistent with public use. So far no land has been reserved under this law.

As an item of interest it may be noted here that Chapter 2, Public Laws of 1935, authorizes the State Highway and Public Works Commission to acquire land for the proposed Park to Park Highway and to transfer such lands to the Federal Government for federal parkways. While the Department of Conservation and Development has no official connection with this parkway, yet as the State administrator of its own scenic areas it has a deep interest in the use of such land for recreation and scenery.

In view of the large amount of work being done on land by the various federal relief agencies, Chapter 115 was enacted by the General Assembly of 1935 at the request of the federal authorities. This act provides for the reimbursement of the Federal Government up to a certain proportion of the sale receipts of benefited land or resulting products as a direct result of federally-paid improvements. This Department has not yet been called upon to authorize settlements with the proper federal authorities as provided in this act.

Resettlement Administration: As a member of the North Carolina Land Policy Advisory Committee, asked for by the Regional Director of the Land Use Planning Division of the AAA (see Fifth Biennial Report, page 50), the State Forester, representing the Department of Conservation and Development, was able to assist in guiding this new relief agency in the selection of submarginal lands which might later be devoted to public use as State forests. The Sandhill Region of Richmond, Moore and Scotland Counties was early decided upon and the work of securing options on land in eastern Richmond and northern Scotland Counties was started in the summer of 1934. Plans which at one time contemplated the acquisition of as much as 125,000 acres have necessarily been modified so that some 60,000 acres is now the approved purchase area. Development plans include a large fish hatchery under the care of the United States Bureau of Fisheries, rearing ponds, and a number of lakes for fishing and other recreational use. An intensive recreation area is in process of construction within a few minutes' drive of United States Highway No. 1. A large forest nursery for the production of pine seedlings for the reestablishment of the forests on these Sandhills and other projects has this year produced many million longleaf and loblolly pine seedlings. The shipmast locust nursery and plantation inaugurated by the United States Bureau of Plant Industry, but now in charge of the Resettlement Administration, is making a success of the production of this strain of black locust, which rarely produces seed and must therefore be propagated from root cuttings.

The Bladen County project has so far been less successful. The effort to establish a bathing beach on Jones Lake for the benefit of the colored people of the region was frustrated by the apparent impossibility of dealing

with one of the landowners. A beach, however, has been constructed at the east end of Singletary Lake in the hope that it may supplement the service now being rendered by the various commercial beaches on White Lake. The first effort in the spring of 1936 to reëstablish a longleaf forest on the south shore of this lake was not successful.

The Crabtree Creek recreational area, optioned and in part acquired by the Resettlement Administration, is now being developed under the general supervision of the National Park Service. This park will, it is said, consist of some 6,000 acres lying between the old and the new highways between Raleigh and Durham.

Several other areas of severely eroded or submarginal farming lands were investigated as possible sites for acquisition areas, but in most cases the possibility of raising tobacco on some of the farms made the price of land so high that they were ruled out of the submarginal class. Among these were lands in western Richmond County, eastern and southern Chatham County, western Davidson County, and several others. The necessity of growing tobacco on sloping lands which will drain quickly favors destructive erosion which undoubtedly will destroy the agricultural possibilities of many of our tobacco-growing lands in the Piedmont section of the State.

National Forests: Following the approval of the two new purchase areas in Piedmont, North Carolina, early in 1934, surveys and options soon demonstrated the impracticability of acquiring more than a few thousand acres of rough forest land at any reasonable price in the proposed Sauratown area of Stokes County. This area was therefore abandoned by the Forest Service and was later approved for acquisition by the Winston-Salem Foundation and other donors as a State park. Surveys and acquisition as well as development work by a CCC camp have continued on the Uharrie Purchase Area, though activities have recently declined on account of the necessarily very slow progress in securing and perfecting land titles. With improvement and coördination of the National Forest Administration, and in order more closely to coöperate with the States, national forest boundaries have been changed so that now the part of the Unaka lying within North Carolina has been added to the Pisgah and the part of the Cherokee has been added to the Nantahala, so that these two forests do not extend beyond the State, but they do contain all National Forest land in the Mountain region. The Croatan Purchase Area which was formerly a portion of the Wambaw is now a national forest itself. More than 100,000 acres in Craven, Jones and Carteret Counties have already been acquired in this area.

Soil Conservation Service: The Department coöperates with the Soil Conservation Service (in the suppression of forest fires within the sphere of its influence) by supplying forest tree seedlings both to the camps which plant the seedlings on farms and also to landowners who, when large areas are to be planted, are required to purchase the seedlings themselves. The Soil Conservation Service also assists in the suppression of forest fires in coöperative counties or protection areas by sending out crews from the camps when called upon by designated State Forestry officials to help; and

by the advocacy of protection in all areas affected by their work. The activities of this organization are confined principally to the Piedmont counties in which erosion control is required. For carrying on their work they now have 20 ECW camps located as follows: Rutherfordton, Shelby, Gastonia, Newton, Statesville, Dobson, Monroe, Polkton, Rockingham, Salisbury, Lexington, High Point, Ramseur, Madison, Burlington, Yanceyville, Durham, Oxford, Franklinton and Lillington. The present activities of the CCC men do not extend more than about twenty-five miles from the camps and a maximum of 25,000 acres of farm land is all that can be accepted under agreement with the landowners from each camp. The work includes planting on submarginal land for the establishment of forests; the planting of trees, shrubs, legumes, grasses, etc., for gully control, and the planting of species suitable for producing food for desirable wild life. In addition, the SCS carries on thinning, stand improvement, sanitation and other improvement activities in the woodlands already established on farms which are in their agreements. They also carry on some general publicity and educational work in coöperation with the Extension Service.

Besides the areas tributary to the camps, the SCS has established eight project demonstration areas covering a total of 361,400 acres. Only two of these conservation surveys have been completed, namely, the Reedy Fork area on the Greensboro city watershed, and the Brown Creek area near Wadesboro. The conservation survey on the Deep River area, north and south of High Point, is nearly completed. Similar surveys are well under way on the other five areas, namely, Huntersville area near Charlotte; Cedar Creek area at Franklinton; Madison area at Reidsville; the Lexington area north of Lexington; and the Stony Creek area north of Burlington. On all of these project areas aerial photographs are used for base maps and the entire watershed or boundary area is covered by the SCS surveys, wooded as well as open land. On wooded areas the timber type is shown, as well as the erosion, slope and soil conditions.

During the winter and spring of 1936, forest planting was done on several hundred farms in thirty North Carolina counties. A similar planting program was carried out during the previous season. In an effort to grow its own planting stock the SCS took over the nursery at Statesville established by the Bureau of Plant Industry, where many introduced trees, shrubs and herbs were tried out to test their suitability for North Carolina soils and climate. A second nursery was established at Polkton and this is devoted largely to the production of such conifers as loblolly, shortleaf and longleaf pine. A third nursery has been developed on the old Mason Farm, belonging to the University of North Carolina, at Chapel Hill. A considerable variety of native hardwoods and some pine is being grown there on an area of approximately one hundred acres of nursery land. In addition to their own production, the SCS have secured a quantity of planting stock from this Department, the forest nursery at Clayton supplying such seedlings as could be spared, keeping in mind the direct demands from the farmers of the State.

State approval of plans and activities of the SCS is formally secured through the SCS State Advisory Committee, which at present consists of the State Director of the Agricultural Extension Service; the Director of the State Agricultural Experiment Station; the State Forester in the

Department of Conservation and Development; and the State Coördinator of the SCS. This committee meets in Raleigh at the request of Dr. J. H. Stallings, State Coördinator, SCS, to consider recommendations, reports and plans for the development of the work.

Tennessee Valley Authority: Outside of Forest Fire Control, the Tennessee Valley Authority is apparently the chief Federal agency coöperating with private landowners in parts or all of fifteen counties within the drainage area of the Tennessee River in western North Carolina in bringing about "the wise utilization of forest resources under conditions of sustained management and minimum waste. In short, the forest as a basic resource constitutes one of the major physical and economic props of the Authority's unified program."

The major contributions of the "Authority" toward this end are briefly given in the following quotations from a "Summary of Activities" very courteously supplied by the Forestry Division of the TVA:

"Under the direction of the Watershed Protection Section of the Forestry Division, three camps were established in North Carolina during August of 1935. These camps were located at Bakersville, Mars Hill, and Arden. At the present time the Bakersville and Mars Hill Camps are still operating with a full enrollment. The camp at Arden has been reduced to a side camp composed of a detail brought from the camp at Mars Hill.

"In connection with these erosion control projects, the CCC Camps, under the supervision of the TVA Foresters, have planted 770,000 locust and pine seedlings on a total acreage of 447 acres. These projects have all been coöperative ones.

"Coöperative fire suppression plans were made between the members of the Forestry Division, the National Forest Supervisor, and the representatives of the State Forester's office. The CCC Camps were used in assisting in the fire control program, and up to June 30, 1936, had helped suppress 23 fires, which it is estimated burned over 1,685 acres.

"The CCC Camps, under the direction of the Watershed Protection Section, have also assisted in the construction of terrace outlets on agricultural lands which had been terraced. This program, however, has been a minor rather than a major one.

"The plans for the coming year, in connection with this watershed program in western North Carolina, call for continuing the camps in their present location and of continuing the coöperative erosion control, reforestation, and fire suppression work.

"A preliminary survey was made in western North Carolina, with the aid of Mr. Graeber, Extension Forester. This survey is covered in an unpublished report entitled 'Forest Development and Stabilized Agriculture in Western North Carolina.'

"Another report briefly summarized the good opportunity for window shade roller manufacture in western North Carolina.

"County surveys of forest conditions were completed early in 1936 on six North Carolina counties; namely, Cherokee, Clay, Graham, Jackson, Macon, and Swain. Briefly, these surveys include the mapping of forest types, condition classes, ownership and use classes; estimates of present volume, growth and drain on the forest resource; and a consideration of many

other related economic factors. Reports on the above-named counties are available for temporary use by interested parties. This type of survey, though probably on a more intensive basis, will gradually be extended to cover the entire 3,500,000 acres in western North Carolina.

"Plans are now under consideration for a more comprehensive survey of Cherokee County, to be conducted by the Resettlement Administration, in coöperation with TVA planning divisions, the U. S. Forest Service, and the State Forestry Division.

"The Tree Crops Unit has established two 15-acre plantings in western North Carolina—one at Lees McRae College in Banner Elk and the other at the John Campbell Folk School in Brasstown. These plantings are experiments, attempting to prove the feasibility of feeding hogs the year around on tree crops."

EMERGENCY CONSERVATION WORK

This report for the period July 1, 1934, to June 30, 1936, follows that given for the previous biennium. All totals and figures relate to the period stated above and grand totals for the whole program from the start can be had by adding the figures in the previous report to those in this biennium.

The Raleigh office personnel handling the work in the camps on State and private land consists of the following members:

F. H. CLARIDGE, Director
 H. J. PAWEK, State Inspector
 B. W. SIPE, Fiscal and Purchasing Agent
 A. M. PLYLER, Engineering Draftsman
 E. C. ROBERTSON, Clerk
 MRS. ELSIE EASON, Senior Stenographer
 MRS. ELSIE DUNN, Senior Stenographer
 MISS ETHEL LEWIS, Junior Stenographer
 MRS. WINONA BROWN, Junior Stenographer

The federal control of the work has been shifted from Asheville, N. C., to the newly established Regional Forester's office in Atlanta, Ga.; and from this office the Regional ECW officer, or his assistants, make frequent inspections of the progress and conduct of the work. Approval of all work projects comes from the Regional Forester's office, Division of State and Private Forestry. The State Forester's office and the Chief of Forest Fire Control outline the projects desired and after approval by the Regional Office as to standards the projects are carried out by the ECW organization.

During this biennium there has been considerable change in the location of the camps, all of which is explained in detail under each camp heading.

In the winter of 1934 there was an expansion of the camps, at which time thirteen private and State land camps were under the supervision of the State Forester's Office and the ECW organization. After this period there was a steady reduction and at the end of the biennium there were seven main camps and two side camps in operation. There has been a constant and successful effort to improve supervision and efficiency in the conduct of the work. Proposed projects have been more carefully scru-

tinized by the Regional Office and the standards of the finished work have been very materially raised.

Attention is invited to the summary of the work accomplished during the biennium at the end of this report. A noteworthy figure is that of the coöperation in fire fighting which amounted to 18,490 man days for the period. Of this figure, 4,058 man days were overtime fighting fire which included work by the camp personnel and enrollees at night, Saturday afternoons, Sundays, and holidays. Coöperation with the fire control organization has been as close as possible under all circumstances.

Attention is also invited to the greatly expanded tower system of 27 towers purchased and erected by the ECW funds and being turned over to the State with a large mileage of telephone lines (369.2 miles) connecting these towers with commercial exchanges and wardens.

Large areas of inaccessible timberland have been opened to fire fighting forces by means of many miles of truck trails. Outstanding examples are mentioned under each camp summary of work.

One of the most noteworthy accomplishments is that of Camp P-63 at Manteo, N. C. This camp entered into a field of work upon which very little had been done on coastal United States; and undertook the fixation of the sand dunes along "the Banks" from Oregon Inlet north to Duck in Dare County. This consisted of the building of sand fences to establish foredunes and the planting of beach grass to stabilize the sand. Widespread interest and commendation has been voiced by government officials and private individuals about this program. The results of this work will probably have a beneficial effect for many years and should indicate the proper treatment of such areas on the Banks.

The expenditure of federal funds for supervision, materials, equipment and improvements from the Raleigh ECW office was \$725,285.68 for the biennium and a grand total of \$1,051,921.51 for this part of the program since its inception. This does not include feeding, housing and welfare of the enrollees, which is handled by the Army.

There follow in detail the accomplishments of each camp during the biennium.

Camp P-51, Jackson Springs, Moore County (White veteran company); Thomas E. Winn, Project Superintendent.

This camp was abandoned on October 31, 1935, on account of the fact that the major portion of the permissible work in the vicinity of this camp had been accomplished and at that time it was necessary to reduce the number of camps in accordance with the President's orders.

The following work was accomplished by this camp from July 1, 1934, until August 31, 1935:

- 968 man days fighting forest fires
- 58.7 miles truck trail constructed
- 83 bridges constructed
- 46.2 miles telephone line constructed
- 1 tower erected
- 2 trailer sheds 20'x22' erected at the
Scotland County and Ellerbe towers

- 1 towerman's house 20'x22' erected at
the Southern Pines tower site
- 1 garage 12'x20' at the Southern Pines
tower site
- 700 bushels longleaf pine cones collected

The major portion of the truck trails listed above was constructed in Moore County. One of the principal ones being along the Moore County-Fort Bragg boundary line, this being an important link in protecting Moore County from fires originating on the Military Reservation. The telephone lines listed above were from the Ellerbe tower to Scotland County tower to Laurinburg system with the inclusion of several spur lines to Wardens' residences. The tower erected was on the outskirts of Southern Pines, at which place was built a residence for the towerman to live in the year round and a garage for the housing of fire fighting equipment. The trailer sheds were erected at the Scotland County and Ellerbe towers.

Camp P-52, Lake Waccamaw, N. C. (Junior white company) ; Charles H. Hearn, Project Superintendent.

This camp was abandoned May 31, 1934. No report for this biennium.

Camp P-53, Fort Bragg, N. C. (Junior colored company) ; D. S. Stubbs and D. A. Huffines, Project Superintendents.

- 1,655 man days fighting forest fires
- 150.4 miles truck trail constructed
- 65 bridges built
- 5 towers erected
- 31 miles telephone line constructed
- 1,839 bushels pine cones collected
- 100 bushels tulip poplar seed collected
- 15,647 man days working in the State Nursery
- 6 trailer sheds erected
- 6 buildings at the State Forest Nursery
erected
- 1 District Forester's Garage and store room
erected

The truck trails listed in the above mileage consist of those constructed in Harnett, Cumberland, Hoke, and Moore Counties. The mileage shown above includes some reconstruction of previously constructed truck trails in order to bring them up to standard. The towers erected were four ECW purchased towers known as follows: the East Robeson tower, the Dudley tower in Wayne County, the Mamers tower in Harnett County, the Young tower in Johnston County and the erection of a State-owned tower near Selma in Johnston County. The telephone mileage listed above consists of the Palestine to Linden system (15.8 miles), the Lillington to Mamers tower system (9.7 miles), and the Dudley tower to Goldsboro (5.5 miles). The trailer sheds listed, 20'x22' feet, were constructed at the following tower sites: Mamers, Proctorville, Parkton, Palestine, Dudley and Pembroke. The District Forester's Garage at Fayetteville was erected on State-owned land under the control of the State Highway Commission near Fayetteville. The

six buildings erected at the State Nursery will be handled under a special report of work done at the State Forest Nursery including the man days listed above as nursery work. In addition to the above work, this camp has been manufacturing concrete pipe for the use of truck trails in the other camps under the State's jurisdiction. The central repair shop at the State Forest Nursery is also manned from this camp. (See special report on this.)

Camp P-54, Walnut Cove, N. C. (Junior white company); J. R. Herman, Project Superintendent.

This camp was discontinued on June 5, 1934, because of the reduction in the camp program and the completion of the work outlined.

Camp P-55, North Wilkesboro, N. C. (Junior white company); T. A. Finley, Project Superintendent.

This camp was discontinued on January 1, 1936, after completing the work as listed below. However, at the present time there is still a contingent of fifty men at this camp finishing up the work, the men being assigned to P-57, Burke County.

- 145 man days fighting forest fires
- 32 miles truck trail constructed
- 25 bridges constructed
- 2 towers erected
- 18.6 miles telephone line constructed
- 300 bushels pine cones collected
- 1 tower cabin built

The above truck trails were constructed in inaccessible parts of Wilkes County. Some of the trails have already been accepted by the State Highway Commission and are being maintained as county roads. The telephone lines consisted of the 18.0 miles Rendezvous Mountain system connecting the Rendezvous Mountain tower with a commercial exchange and several wardens, and also a connection from the Roaring Gap tower to a commercial exchange of one-half mile. The towers were one at Roaring Gap and one on the State Park at Rendezvous Mountain in Wilkes County. The tower cabin was erected at the Roaring Gap tower.

Camp P-56, Durham, N. C. (Junior white company); H. J. Pawek, Project Superintendent.

This camp was abandoned on November 16, 1934, on account of the completion of the approved projects for this camp. The following is the report of accomplishments from July 1, 1934, to November 16, 1934:

- 18.9 miles truck trail constructed
- 11 bridges built
- 1,381 man days work in the State Nursery,
Clayton
- 1 caretaker's house on the Hill Forest
- 1 septic tank and filter at the Hill Forest

The truck trails mentioned above were constructed mostly in Durham County. Some little truck trail work was done on the Duke Forest and

the Hill Forest. The caretaker's house was erected on the Hill Forest, which is controlled by the Forestry Department of State College. It consists of a two-story dwelling. The septic tank and filter of fifty-man capacity was built to take care of the occupants of the caretaker's house and the large log cabin. Over 1,000 man days were used on the large log cabin which is to house the Forestry School students of State College.

Camp P-57, Enola, N. C., Burke County (Junior white company); W. R. Patton, Project Superintendent.

The following is a summary of activities:

- 1,003 man days fighting forest fires
- 30.3 miles truck trail constructed
- 6 bridges built
- 58.1 miles of telephone line constructed
- 32 bushels of pine cones collected
- 1,069 man days working on Hickory Municipal area
- 1 lookout house constructed
- 2 tower cabins constructed
- 2 lookout towers

The truck trails constructed as listed above were a very important link in the fire control plan for Burke County and vicinity. It consists largely of opening up the South Mountain area to the fire control organization and the building of a truck trail to Table Rock, both of these projects receiving very favorable comments from officials and private individuals. The two towers were on Biggerstaff Mountain, Burke County, and Hawshaw Mountain in Avery County. The telephone lines consisted of the following: 3.9 miles to the Hibriten tower, Caldwell County; 18.2 miles from Morganton to Table Rock system; 3.6 miles to the Hawshaw Mountain tower in Avery County; 1.7-mile Wise-Dellinger line; 26.3-mile Horse Ridge-Biggerstaff system; 4.5-mile Hoyle line. The man days on the Hickory Municipal watershed were devoted to erosion control, picnic ground development, forest tree planting and stand improvement. It is expected to continue this work as soon as more men are available. The lookout house, 14'x14', was located on Table Rock. Tower cabins were erected at Hawshaw Mountain and Biggerstaff Mountain at tower sites.

Camp P-59, Windsor, N. C. (Junior white company); C. M. Newcomb, Project Superintendent.

This camp was abandoned on August 1, 1935, after the completion of the work projects as outlined and because of the necessity for reducing the camps. The work accomplished by this camp consisted of the following:

- 134 man days fighting forest fires
- 61.5 miles truck trail constructed
- 21 bridges constructed
- 14 miles telephone line constructed
- 3 lookout towers erected
- 4 trailer sheds constructed
- 4 privies constructed

The above listed towers were as follows: Greens Cross, Bertie County; Tuscarora, Craven County, and the moving of the Norfleet tower, Bertie County. The trailer sheds and privies were erected at the following places: Norfleet tower site, Tuscarora tower site, Thomas tower site in Hertford County, and Greens Cross tower in Bertie County. The truck trails were in Bertie County and broke up large accessible areas so that fires could be readily controlled.

Camp P-60, Hollister, N. C. (Veteran colored company); R. D. Gladding and E. C. Robertson, Project Superintendents.

This camp was abandoned on October 18, 1935, with the completion of the scheduled work for this vicinity. The following are the accomplishments of the camp from July 1, 1934, to October 18, 1935:

- 1,929 man days fighting forest fires
- 50.6 miles truck trail constructed
- 97 bridges constructed
- 3 towers erected
- 13.9 miles telephone line constructed
- 4 trailer sheds constructed
- 3 privies constructed

The above truck trails were constructed in Halifax, Nash and Warren Counties. The towers were the Liles tower in Halifax County, the Swift Creek tower in Nash County and the Wilson tower in Wilson County. The trailer sheds, 20'x22', were built at the following tower sites: Liles; Wilson County; Warren County; and Swift Creek, Nash County. The three privies were erected at the Liles tower site, Wilson County tower site and Swift Creek, Nash County, tower site. The telephone lines consisted of one-half mile from the Wilson tower to Wilson; one mile from the Swift Creek tower to a commercial line; 5.2 miles from the Scotland Neck tower to a commercial exchange; 7.2 miles from the Liles tower in Halifax County to a commercial line.

Camp P-61, Lake Lure, N. C. (Veteran white company); Fred M. Slagle, Project Superintendent.

This camp was abandoned on December 31, 1934, and the summary below is work completed from July 1, 1934, to December 31, 1934:

- 10.2 miles truck trail constructed
- 31.2 miles telephone line constructed
- 3 towers erected
- 3 tower cabins constructed

The telephone lines listed above consisted of the Bearwaller system of 13.7 miles; High Windy of 2.5 miles; Chambers Mountain of 2.5 miles; Tryon Mountain of 4.2 miles; Pinnacle-Union Mills system of 8.3 miles. The towers consisted of Chambers Mountain, Haywood County; High Windy, Buncombe County; Tryon Mountain, Polk County. The three tower cabins, 10'x14', were erected on High Windy tower site, Chambers Mountain tower site and Tryon Mountain tower site.

Camp P-62, Southport, N. C. (Junior white company); R. D. Gladding and W. P. Killette, Project Superintendents.

This camp was established on October 5, 1934, for work in Brunswick County. The following is the work accomplished from October 5, 1934, to June 30, 1936:

- 6,102 man days fighting forest fires
- 39 miles truck trails constructed
- 31 bridges constructed
- 3 towers erected
- 55 miles telephone line constructed
- 1 trailer shed constructed
- 1 privy constructed

Attention is invited to the large number of man days fighting forest fires. This camp has the most difficult job in supplementing the regular fire control organization as fires burn in this county at almost any season when the weather is dry and are difficult to control on account of the large number of bays in the county. The three towers erected from this camp were at Jones Lake, Bladen County; Shallotte in Brunswick County, and Maco in Brunswick County. The telephone lines were 35.1 miles Shallotte to Warden Jones; 12.2 miles Reed to Orton system; and spur lines to wardens 8 miles. The trailer shed, 20'x22', and privy were constructed at the Shallotte tower site.

Camp P-63, Manteo, N. C., Dare County (Junior white company); H. J. Pawek, M. R. Blackmon and H. A. White, Superintendents.

This camp was established on October 11, 1934, and turned over to the Biological Survey on April 15, 1936. The work accomplished at this camp was as follows:

- 21.8 miles of brush sand fences constructed
- 1,868 acres grass planting
- 22,790 sq. yds. brush paving
- 50 acres tree planting
- 89 bushels cypress cones collected
- 205 man days developing duck ponds
- 73,114 yds. mosquito control ditching

This camp continued after April 15, 1936, under the U. S. Biological Survey on land acquired by the Survey for a water fowl sanctuary. The technicians at the camp are carrying forward records as to the efficiency of the different types of sand fences through an agreement with the Biological Survey. The work has already shown remarkable promise and it is hoped that the areas can be maintained, allowing full developments of the control work. The problems worked upon were the large wind eroded gullies on Roanoke Island which were piling sand on cultivated land and threatening the highway from Manteo to Fort Raleigh. Along the beach proper sand fences and beach grass plantings were undertaken on Bodie Island and also between Nags Head and Kitty Hawk north to Duck. It is hoped to get a full report of this undertaking in shape for publication in the near future.

Camp P-64, Laurinburg, N. C. (Junior white company); S. W. Hill, Project Superintendent.

This camp was established on October 4, 1934, and abandoned on October 18, 1935, on account of the reduction in the camp program and the completion of authorized projects. Some of this camp's accomplishments follow:

- 331 man days fighting forest fires
- 47 miles truck trail constructed
- 12 bridges constructed
- 14.8 miles telephone line constructed

The truck trails listed above were constructed mostly in Scotland County and on the State Sanitarium land in Hoke County. Inaccessible timber areas were opened up in these counties. The telephone lines consisted of 7.3 miles from Laurel Hill to Currie line; 1-mile Raeford to McLean line; 2-mile Warden Monroe to tower system line; 1.5-mile Warden Bostick line; 3-mile Warden Barber line.

Camp S-65, Maysville, N. C. (Junior white company); S. C. Shearin, Project Superintendent.

This camp was established on May 20, 1935, on the property of the Forestry Foundation, Inc., management being under the State College Forestry Department. The following is a summary of the activities of this camp:

- 2,721 man days fighting forest fires
- 6.4 miles truck trail construction
- 4 bridges constructed
- 300 acres planting to forest trees
- 315 acres of forest stand improvement
- 325 bushels of pine cones collected
- 11,533 acres of timber stand estimating
- 56 miles of lineal survey
- 1 tower erected

This camp is faced with a very serious and hazardous fire condition in the White Oak Pocosin which comprises a good portion of the area being worked on. The truck trail construction is very difficult and time-consuming due to the nature of the mucky ground. The one tower erected was at Comfort, near the Jones-Onslow County line. Little work has been done outside of the area controlled by the Forestry Foundation, Inc.

Camp P-66, Brevard, N. C. (Junior white company); R. E. Staton, Project Superintendent.

This camp was established on May 20, 1935. The summary of the activities follows:

- 1,016 man days fighting forest fires
- 13.7 miles truck trail constructed
- 1 tower erected
- 6 bridges built
- 1 cabin constructed
- 14.3 miles telephone line constructed

The truck trails being constructed by this camp open up inaccessible mountainous areas in Transylvania and Henderson Counties. The tower was erected on Toxaway Mountain in Transylvania County and a truck trail was constructed to this tower. The cabin, 10'x14', was erected on the top of Toxaway Mountain. The telephone line was the Toxaway Mountain-Fairfield-Lake Toxaway system.

Camp P-67, Washington, N. C. (Junior white company); C. M. Newcomb, Project Superintendent.

This camp was established on July 12, 1935. A summary of activities follows:

- 1,763 man days fighting forest fires
- 21 miles truck trail constructed
- 9 bridges built
- 2 towers erected
- 7.5 miles telephone line constructed
- 2 trailer sheds constructed
- 2 privies constructed

The truck trails are mainly in what is known as the J. & W. tract in Beaufort and Martin Counties. A large part of the construction follows the spoil banks left from abandoned drainage operations. The two towers are at Everett, Beaufort County, and Wilmar, Craven County. The telephone lines were from Warden Woolard to Washington, 2.5 miles; and from Plymouth to County Warden Darden in Martin County, 5 miles. The privies and trailer sheds were constructed at the Everett and Wilmar towers.

Camp P-68, White Lake, N. C. (Junior white company); Donald S. Stubbs, Project Superintendent.

This camp was established on June 10, 1935. A summary of the activities follows:

- 613 man days fighting forest fires
- 44.1 miles truck trail constructed
- 18 bridges constructed
- 2 towers erected
- 56.4 miles telephone line constructed
- 1 trailer shed
- 1 privy

The above truck trails consisted of new work in Bladen County and reconstruction work in Columbus and Scotland Counties. At Laurinburg, a side camp was maintained for some time to bring the projects up to standard. The two towers were at Newkirk and Rose Hill. The telephone line consisted of 16.9-mile Cedar Creek system to Fayetteville; 39.5-mile Jones Lake to Rose Hill. In the case of the Jones Lake to Rose Hill line, this is not the complete mileage of the system, which will continue on to connect up two more towers. The trailer shed, 20'x22', and privy were erected at the Jones Lake tower.

Camp P-69, Butters, N. C. (Junior colored company); P. H. Gallagher, Project Superintendent.

This camp was established on June 10, 1935, and abandoned on January 7, 1936. The short duration of this camp was due to the small amount of authorized work available. The summary of the activities follows:

- 110 man days fighting forest fires
- 20.6 miles truck trail constructed
- 8.2 miles of telephone line constructed
- 1 trailer shed
- 1 privy

The truck trails constructed were in Robeson and Bladen Counties. The telephone line was from East Robeson tower to Lumberton. The trailer shed, 20'x22', and privy were erected at the East Robeson tower.

ECW Activities at the State Forest Nursery: This is one of the major projects of the ECW organization and the work has been greatly expanded upon plans worked out by the State Forester and the ECW organization. During this biennium the following buildings were erected on the south side of N. C. Highway No. 70 for maintaining a 50-man side camp and improving the working facilities at the State Forest Nursery:

- 1 barracks 20'x34'
- 1 office building 19'x23'
- 1 supervising personnel quarters 24'x42'
- 1 warehouse 18'x70'
- 1 latrine 16'x18'
- 1 central repair shop 54'x60'

During the last growing season the major portion of the work in raising and distributing over 3,000,000 tree seedlings was an accomplishment of the ECW organization. The total work for the biennium was 17,028 man days on this State-owned property, 1,381 of these man days being from P-56 in Durham and the remainder from the Negro juniors from Camp P-53, Fort Bragg.

With the addition of some 100 acres to the nursery, expanded activities are anticipated for the whole nursery area. Drainage, clearing, preparation of seed beds, the improvement of the soil, and organizing the nursery into one of the best in the South is the aim at this place.

Before the end of the biennium the ECW organization had undertaken the drilling of a 6-inch diameter deep well on the north side of Highway No. 70. A tower and a 5,000-gallon tank have been purchased and will be erected near the well, which is expected to give a supply of 40 gallons per minute.

A seed extraction house is proposed, in addition to the other buildings already erected.

Central Repair Shop at the State Nursery: This shop consists of a building 54'x60' fully equipped with the latest tools and equipment needed for the repair of trucks and tractors. Three mechanics are employed and about 20 CCC enrollees are used each day. The output of this shop is the complete

overhauling and rebuilding of about three to four trucks a week. It is considered one of the best of its kind in this region.

Summary: The main accomplishments of the ECW camps in this program during the biennial period are as follows:

- 18,490 man days fighting forest fires
- 604.4 miles truck trails constructed
- 388 bridges built
- 27 towers erected
- 369.2 miles telephone line constructed
- 3,385 bushels cones collected

For summary of sand dune control see Camp P-63.

DIVISION OF GAME AND INLAND FISHERIES

The State of North Carolina, like all other States in the Union, is custodian of the wildlife population within the State borders. Wildlife includes the fishes that inhabit the streams of the State as well as the game animals and game birds of the fields and forests, and during the past few years the problem of maintaining this game and fish population has become increasingly important because of the increased demand from our people. The natural increase in the population, shorter working hours, which give the people more leisure time to spend out of doors in the pursuit of recreation; and improvement in the road system, thus giving people access to all parts of the State, make it necessary to carry on a program of game management and fish culture adequately planned not only to meet the demands of the people of this day, but to assure a continuation of the wildlife supply for the coming generation.

The present Game Law, which was passed by the 1935 Legislature, giving the Board of Conservation and Development the broader authority in administering the wildlife program, has enabled the Department to cope with the situation in a more satisfactory manner than in the past; and the people of the State are showing a great interest in the wildlife problems and a willingness to lend their coöperation in the work.

This is an era of conservation. The people of North Carolina are not alone in their efforts to maintain and increase the wildlife population. The people of the United States, as a whole, are becoming conscious of the value of wildlife as a natural resource with economic as well as social values; and every State in the Union is taking steps to conserve its wildlife. Various bureaus of the Federal Government, namely, the U. S. Bureau of Fisheries, U. S. Bureau of Biological Survey, U. S. Forest Service, U. S. Park Service and the relief organizations of the Federal Government, are lending their aid in carrying on this work. These agencies have been especially coöperative in North Carolina.

The major activities of the game and inland fisheries division will be enumerated as follows:

GAME

During the past biennium there has been a marked improvement on the part of the people in the observance of the game laws. This is due to: First, the desire of the people to do their part in maintaining the wildlife population; second, to the increased efficiency of the enforcement organization. Since 1934, the increase in revenue has enabled the Department to restore the game protector service to a point where there is now a more efficient working force in the field to check hunters and fishermen for violations of the game and fish laws. This service is not yet perfect. The revenue is still comparatively small, and consequently it is not yet possible to pay adequate salaries and employ a sufficient number of field men, but with improved conditions and increasing license sales, a steady improvement in the service may be expected. The law enforcement men are entrusted with

the duty of educating the people in the conservation laws and familiarizing them with the value and purposes of the program and to prosecute those who persist in violating the laws.

Work in artificial game propagation is limited to a one-man unit at the Fayetteville Fish Hatchery, where a few quail are raised each season for restocking refuges in the State. Sufficient brooder equipment is not available to raise any quantity of birds, but through WPA aid and together with some of the game funds allotted by the Board for turkey raising at Fayetteville, there is under construction a brooder house which will be properly equipped to take care of the turkey hatchings next spring and also an increased hatch of quail. This unit, when completed, will still be operated by one man and a part-time helper. Because of limited capacity, a general distribution cannot be expected. The unit, however, should be capable of raising enough turkeys and quail to help repopulate the refuges and protected areas in the State. A similar project for turkey raising has been approved for the Mount Mitchell Game Refuge in Western North Carolina and will be made ready in time for the 1937 hatching season.

In addition to the State's limited efforts toward artificial propagation of upland game birds, the Resettlement Administration is constructing a hatching unit on the Sandhills (N. C. 3) project to be used in the propagation of quail and turkeys for restocking the various resettlement areas and other federal-owned land within the State.

Our main problem is to educate the people to the wise use of our present wildlife resources, so that an ample supply may be enjoyed by this generation and at the same time leave plenty for the future. This cannot be accomplished through artificial propagation of game. It must be done largely by strict observance of the regulations, which are designed to provide a proper balance now and in the future.

The present North Carolina game statute, Chapter 486, Public Laws of 1935, known as the North Carolina Game Law, is regarded throughout the United States and neighboring foreign countries as one of the outstanding game laws in the United States. The following are a few opinions from leading authorities on our game laws:

H. P. Sheldon, Chief, Division of Public Relations, Bureau of Biological Survey, Washington, D. C.

"Your letters of November 12th to Mr. Darling and Mr. Young have both been received, and we have read with much interest the compilation of game laws which you sent. You ask our comment particularly as to the new game law, and in reply I would say that while we have not had an opportunity to study carefully all of its provisions, yet we are impressed with the fact that the legislature has finally recognized the importance of vesting the Department with plenary power to fix seasons and bag limits, which we consider one of the very important phases of game law legislation. Since the legislatures usually meet once in two years, it is frequently necessary to have some action taken to meet emergency conditions that cannot await the regular assembly of the legislative body. The only way to accomplish this is to vest such regulatory powers in the State Game Department. Our experience has shown that very rarely, if ever, is this authority misapplied.

"The compilation is a neat and handy one, and we are very glad to have copies of it."

M. D. Hart, Executive Secretary, Commission of Game and Inland Fisheries, Richmond, Virginia.

"Yours of the 6th. I've just gone over the copy of your 1935 game and inland fish laws and wish to compliment you highly on its comprehensiveness. In my opinion, it is peer to any of those in our Southern States. If the sportsmen of North Carolina will now rally behind you and give you their support in its enforcement I see no reason but that in a few years you will have more game and game fish in North Carolina than you have had for the last twenty-five years."

I. T. Quinn, Commissioner, Department of Conservation, Montgomery, Ala.

"I have been waiting for the arrival of copy of your game laws before replying to your letter of November 6th. They have just arrived and I want to assure you of my appreciation of this copy of your laws. I think you will find it meeting with general favor the power of your Board to fix seasons and bag limits. Such legislation was enacted into law by our present legislature and as soon as our laws come from the press will furnish you a copy of same."

H. J. Burlington, Executive Secretary, Board of Fish and Game Commissioners, Trenton, N. J.

"Replying to your letter of November 12 enclosing new booklet on North Carolina Game Laws, beg to say that we believe this to be the finest setup of game laws that we have seen, and we sincerely trust your new system will work out satisfactorily.

"We are sending under separate cover copy of our latest synopsis of game laws, which is practically along the same lines as yours except that we, of course, have not all the rights and privileges that your Board has."

Seth Gordon, Secretary, American Wildlife Institute, Washington, D. C.

"I greatly appreciate your letter of November 6 and the copy of your new game and fish laws. You certainly have made great progress this year, and I am delighted to note that so much of the model law was useful. My hearty congratulations!

"One of the things that has stifled game and fish work in your State has been lack of adequate machinery. Now you apparently have it. And I am sure you will advance much more rapidly in the future."

Arthur C. Clark, Superintendent, State Board of Fisheries and Game, Hartford, Conn.

"I appreciate your thoughtfulness in sending me a copy of your new booklet, containing your new game laws as passed by the 1935 legislature. I have read the first eighteen pages carefully and have glanced over the other laws, which have to do mostly with the details of your open seasons, regulations, etc.

"I am certainly very glad to offer my sincere and enthusiastic congratulations to you and to your Board, as well as to the legislature of your State for writing, sponsoring and passing a conservation law which is so thoroughly sound and practical in principle.

"It seems to me that Section 4, defining the powers of the Board, is most complete and commendable. We have pretty liberal laws in Connecticut, but since they are revisions of older laws, they are much less complete than the ones under which you are operating in North Carolina. I am particularly glad to note that the Commissioner is appointed by the Director with the approval of the Board. I assume this relieves you of a great deal of outside pressure which would be objectionable and harmful to the best administration of the Department."

SALE OF HUNTING LICENSES, 1934-35

COUNTY	Non-Resident	State	County	Combination	Fur Dealers and Trappers		Total
					Trappers	Fur Dealers	
Alamance.....	1	649	1,751	79	\$ 17.00	\$ 10.00	\$ 2,439.60
Alexander.....		51	386	6	16.00	35.00	363.40
Alleghany.....		15	274	32	16.00	10.00	285.80
Anson.....	4	55	1,221	38	32.00		902.70
Ashe.....		4	885	2	8.00	55.00	529.30
Avery.....	6	53	515	9	8.00	5.00	462.60
Beaufort.....	45	270	1,231	32	79.00	40.00	1,772.30
Bertie.....	8	136	1,470	63	60.00	135.00	1,464.70
Bladen.....	10	176	1,372	6	18.00	10.00	1,183.40
Brunswick.....	9	59	792	11	16.00	45.00	696.90
Buncombe.....	9	716	3,893	376	4.00	60.00	4,622.90
Burke.....		144	811	62	7.00		880.30
Cabarrus.....		308	577	72	5.00		1,118.30
Caldwell.....	1	141	1,345	50	11.00	25.00	1,145.50
Camden.....	18	73	239		73.00		518.50
Carteret.....	70	101	759	1	10.00		1,344.40
Caswell.....	2	7	42				55.00
Catawba.....		255	410	84	16.00		964.60
Chatham.....	72	111	794	25	14.00	25.00	1,450.50
Cherokee and Clay.....		102	715	55	18.00	85.00	824.00
Chowan.....	2	69	210	1	22.00	10.00	297.90
Clay—in Cherokee.....							
Cleveland.....		194	975	111	39.00		1,236.40
Columbus.....	50	169	1,661	33	40.00	260.00	2,094.20
Craven.....	33	533	2,007	72	63.00	160.00	2,836.30
Cumberland.....	5	412	1,471	48	56.00	75.00	1,879.70
Currituck.....	42	35	279		227.00	5.00	861.50
Dare.....		3	26		12.00		31.00
Davidson.....	20	330	1,348	61	15.00		1,725.90
Davie.....	1	123	767	4	6.00		657.10
Duplin.....	8	409	1,595	48	28.00	45.00	1,917.70
Durham.....	2	1,137	919	157	11.00		3,219.80
Edgecombe.....	13	452	1,786	271	88.00	85.00	2,885.90
Forsyth.....		1,474	1,786	171	63.00	10.00	4,409.90
Franklin.....	2	93	1,139	11	44.00	5.00	856.40
Gaston.....		549	933	58			1,732.70
Gates.....	26	44	626	5	25.00	35.00	735.50
Graham.....	7	15	436	6	14.00	10.00	359.40
Granville.....	3	56	368	33		5.00	426.70
Greene.....		64	447	119	13.00		709.60
Guilford.....	38	1,580	1,519	241	20.00		5,018.40
Halifax.....	30	391	2,782	117	87.00	130.00	3,029.30
Harnett.....	8	284	1,049	77	26.00	10.00	1,431.80
Haywood.....	2	136	1,290	69	2.00	65.00	1,204.10
Henderson.....		132	1,096	47	37.00	15.00	1,000.30
Hertford.....	18	103	923	24	30.00	75.00	1,022.10
Hoke.....		83	645	21	8.00		557.40
Hyde.....	78	140	695	66	118.00	45.00	1,931.90
Iredell.....	1	200	2,341	49	72.00	10.00	1,804.60
Jackson.....		21	418	28	6.00	15.00	353.20
Johnston.....	2	199	2,963	109	42.00	10.00	2,267.60
Jones.....	3	71	735	10	4.00	35.00	607.50
Lee.....	2	133	455	28	11.00		605.70
Lenoir.....	6	396	961	394	31.00	175.00	2,681.28

SALE OF HUNTING LICENSES, 1934-35—Continued

COUNTY	Non-Resident	State	County	Combination	Fur Dealers and Trappers		Total
					Trappers	Fur Dealers	
Lincoln.....		60	162	51	\$ 11.00	\$.....	\$ 359.90
Macon.....		19	405	3	2.00		251.20
Madison.....		28	632	5	13.00	10.00	409.50
Martin.....	5	219	1,135	79	38.00	65.00	1,387.60
McDowell.....		80	586	12	5.00		492.80
Mecklenburg.....	2	844	2,493	215	33.00	25.00	3,636.00
Mitchell.....		27	530	19	9.00	10.00	393.10
Montgomery.....	2	157	582	48	11.00	55.00	830.20
Moore.....	56	269	611	46	22.00	25.00	1,583.90
Nash.....	2	479	1,790	136	75.00	10.00	2,352.40
New Hanover.....	22	658	531	63	15.00	35.00	2,034.20
Northampton.....	9	54	1,543	30			1,056.50
Onslow.....	45	118	943	5	28.00	135.00	1,435.10
Orange.....		173	807	50	17.00		911.50
Pamlico.....	22	82	390		5.00	25.00	624.00
Pasquotank.....	13	212	464	7	25.00	200.00	1,031.30
Pender.....	12	102	1,216	10	28.00	25.00	1,014.00
Perquimans.....	6	23	393		13.00		315.50
Person.....	4	24	158	1	11.00		180.90
Pitt.....	1	515	1,671	211	88.00	175.00	2,750.40
Polk.....	1	29	555	20	12.00		415.50
Randolph.....	25	163	310	27	12.00	125.00	946.30
Richmond.....	4	283	1,763	57	35.00	5.00	1,692.80
Robeson.....	35	451	2,021	97		145.00	2,728.90
Rockingham.....	12	358	2,667	37	14.00	25.00	2,315.80
Rowan.....		405	1,019	73	4.00		1,535.20
Rutherford.....	2	124	1,291	42	19.00		1,054.30
Sampson.....	7	167	1,208	13	9.00	145.00	1,199.70
Scotland.....	9	105	794	15	3.00	25.00	768.50
Stanly.....		285	688	83	14.00		1,168.70
Stokes.....		18	365	4	11.00		241.10
Surry.....	2	135	830	13	29.00		771.70
Swain.....	1	18	182	11	2.00		170.90
Transylvania.....	13	23	279	3		35.00	359.20
Tyrrell.....	5	24	325	3	36.00	15.00	320.20
Union.....		70	1,700	23	45.00	5.00	1,106.70
Vance.....	2	270	1,155	48	28.00		1,304.70
Wake.....	2	767	2,175	260	20.00		3,415.50
Warren.....	2	123	1,863	28	43.00		1,321.70
Washington.....	2	102	424	12	34.00	445.00	949.80
Watauga.....		17	445	9	2.00	20.00	304.60
Wayne.....	1	299	1,556	189	33.00	90.00	2,057.10
Wilkes.....		52	355	19	15.00	60.00	411.60
Wilson.....	1	392	1,140	138	43.00	10.00	1,817.20
Yadkin.....		72	195		11.00		252.50
Yancey.....	3	65	329	4	3.00		339.10
Miscellaneous Sales.....	17	17	20	14	14.00	310.00	678.60
Total.....	1,004	22,433	98,829	5,725	\$2,558.00	\$4,095.00	\$128,111.00
Mattamuskeet Lake.....							\$ 1,609.50
Grand Total.....							\$129,720.50

SALE OF HUNTING LICENSES, 1935-36

COUNTY	Non-Resident	State	County	Combination	Trappers	Total
Alamance.....		1,096	884	103	11	\$ 3,411.00
Alexander.....		98	290	11	3	528.00
Alleghany.....		33	232	35	15	433.00
Anson.....	3	95	737	53	19	1,171.00
Ashe.....		21	512	6	4	580.00
Avery.....	2	65	300	16	5	518.00
Beaufort.....	61	735	1,030	44	43	3,641.00
Bertie.....	9	233	1,471	113	26	2,468.00
Bladen.....	9	297	900	29	1	1,718.00
Brunswick.....	9	112	683	2	11	1,071.00
Buncombe.....	11	1,103	2,176	410	12	5,804.00
Burke.....		227	552	80	4	1,255.00
Cabarrus.....		630	326	119	1	1,946.00
Caldwell.....	3	270	1,011	86	3	1,863.00
Camden—see Pasquotank						
Carteret.....	32	154	491	3	5	1,298.00
Caswell.....	10	93	525	4	4	881.00
Catawba.....		672	1,080	5	15	2,788.00
Chatham.....	53	196	440	9	10	1,741.00
Cherokee.....	1	165	544	51	4	1,050.00
Chowan.....	3	97	153	2	15	440.00
Clay.....		8	95	5	2	130.00
Cleveland.....		409	744	132	17	2,005.00
Columbus.....	56	362	1,248	71	35	3,096.00
Craven.....	19	717	1,101	56	7	3,003.00
Cumberland.....	8	649	767	100	14	2,517.00
Currituck.....	189	92	395	2	145	3,716.00
Dare.....	26	44	188	1	43	757.00
Davidson.....	29	636	831	54	8	2,720.00
Davie.....		253	523	7	5	1,063.00
Duplin.....	15	663	1,261	93	23	3,137.00
Durham.....		1,387	365	242	4	3,876.00
Edgecombe.....	10	673	1,171	309	64	3,738.00
Forsyth.....	5	1,901	975	219	19	5,562.00
Franklin.....		137	607	16	24	979.00
Gaston.....		806	500	62	3	2,306.00
Gates.....	24	127	547	7	30	1,252.00
Graham.....	1	12	323	11		395.00
Granville.....	5	154	483	27	9	967.00
Greene.....		99	299	134	6	914.00
Guilford.....	47	1,799	758	258	8	5,854.00
Halifax.....	17	582	1,588	138	23	3,475.00
Harnett.....	12	471	623	101	10	2,074.00
Haywood.....	8	271	871	102	1	1,841.00
Henderson.....	4	202	822	74	16	1,545.00
Hertford.....	29	163	707	43	23	1,649.00
Hoke.....	2	191	446	18		912.00
Hyde.....	37	154	478	30	94	1,619.00
Iredell.....	2	455	1,373	62	12	2,527.00
Jackson.....	2	38	262	32	2	468.00
Johnston.....		336	1,597	112	13	2,633.00
Jones.....	7	196	493	10	7	1,034.00
Lee.....	4	198	259	20	7	791.00
Lenoir.....	5	479	593	434	30	2,992.00
Lincoln.....	2	122	113	47	2	534.00
Macon.....		27	426	4	5	502.00

SALE OF HUNTING LICENSES, 1935-36—Continued

COUNTY	Non-Resident	State	County	Combination	Trappers	Total
Madison.....	3	38	376	6	2	\$ 519.00
Martin.....	8	291	727	105	31	1,816.00
McDowell.....		186	455	22	2	897.00
Mecklenburg.....		1,229	1,036	213	9	4,154.00
Mitchell.....		83	420	25	9	681.00
Montgomery.....	2	228	425	48	6	1,069.00
Moore.....	40	375	333	73	2	1,906.00
Nash.....		587	1,022	120	34	2,634.00
New Hanover.....	10	796	256	79	7	2,251.00
Northampton.....	3	69	1,166	44	21	1,524.00
Onslow.....	32	207	708	15	39	1,726.00
Orange.....		245	515	57	15	1,212.00
Pamlico.....	14	94	287		4	694.00
Pasquotank and Camden..	34	375	373	8	59	1,786.00
Pender.....	20	233	1,011	23	16	1,881.00
Perquimans.....	7	34	305	1	13	508.00
Person.....	6	146	509	4	4	913.00
Pitt.....	3	666	1,241	312	39	3,644.00
Polk.....		57	408	28	6	618.00
Randolph.....	25	282	189	44	6	1,276.00
Richmond.....	4	492	1,053	72	17	2,351.00
Robeson.....	33	665	1,390	170		3,725.00
Rockingham.....	3	571	1,211	48	12	2,569.00
Rowan.....	1	869	971	80	12	2,993.00
Rutherford.....		203	787	52	13	1,381.00
Sampson.....	9	364	1,214	30	5	2,182.00
Scotland.....	6	171	420	17	7	919.00
Stanly.....	1	446	389	108	8	1,640.00
Stokes.....		25	237	4	5	310.00
Surry.....	3	176	711	11	13	1,170.00
Swain.....	2	22	86	11		193.00
Transylvania.....	19	47	301	7	4	709.00
Tyrrell.....	12	64	211	10	30	612.00
Union.....		178	816	27	22	1,302.00
Vance.....	2	340	634	55	14	1,542.00
Wake.....	6	1,055	1,358	250	11	4,336.00
Warren.....	5	143	1,251	28	11	1,721.00
Washington.....		127	249	22	16	608.00
Watauga.....		46	252	22	2	414.00
Wayne.....	7	507	1,082	203	15	2,844.00
Wilkes.....		97	146	18	4	403.00
Wilson.....		552	860	178	14	2,531.00
Yadkin.....		94	60	1	3	260.00
Yancey.....		98	258	6	5	484.00
Miscellaneous Sales.....	28	43	48	26	4	643.00
Total.....	1,119	34,821	65,935	6,897	1,493	\$176,739.00
Mattamuskeet Lake.....						\$ 895.50
Fur Dealers' Licenses.....						3,928.00
Guides' Licenses.....						885.00
						\$182,447.50

All Guides' and Fur Dealers' Licenses listed separately.

PROPAGATION LICENSES
(To keep game birds in captivity)

JUNE 30, 1934, TO JUNE 30, 1935

C. H. Rary, Kannapolis
R. T. Brantley, Mooresville
John Freeman, Raleigh, Route 3
L. M. Cahoon, Swan Quarter
R. L. Welch, Jr., Matthews
Ed. W. Hassenbruch, Lake Landing
Leland Carawan, New Holland
Rumley Spencer, New Holland
M. L. Daniels, Manteo
J. Manson McClees, Oriental
Long Creek Lodge, Winston-Salem
J. S. McInnes, Raleigh
Kendall Brothers, Guilford
A. C. Frazier, Randleman
Frank W. Fuller, Salisbury
Dixie Game Farm, Salisbury
Montvale Game Farm, Lake Toxaway
J. E. Fox, Siler City
Julian T. Bishop, Carthage

JUNE, 30, 1935, TO JUNE 30, 1936

Fanning Fields Farm, Fletcher
Montvale Game Farm, Lake Toxaway
Frank W. Fuller, Salisbury
Julian T. Bishop, Carthage
E. B. Kinsey, Asheville
T. A. Neal, Swan Quarter
J. L. Simmons, Fairfield
Reuben Barry, Fairfield
Clifton Mooney, Fairfield
P. C. Simmons, Fairfield
W. B. Nixon, Jr., Fairfield
Dr. H. H. Fries, Tillery
F. M. Simpson, Charlotte
C. G. Lewis, Kinston
H. A. Beard, Erwin
S. P. Birkitt, Charlotte
L. W. Pridgen, Jr., Charlotte
R. L. Brinson, High Point
R. M. Wearn, Matthews
Dr. Z. F. Long, Rockingham
P. K. Gravely, Rocky Mount
E. W. Freeze, Jr., High Point
Julian L. Gray, Portsmouth
J. Hal Lassiter, Greensboro
J. E. McInnes, Raleigh

Edw. C. Hassenbruch, Lake Landing
 Dixie Game Farm, Salisbury
 John J. Larew, Mocksville
 Kendall Bros., Guilford
 Long Creek Lodge, Winston-Salem
 Dr. H. H. Fries, Tillery
 R. L. Welch, Matthews
 Mrs. J. E. Fox, Siler City
 C. G. Lewis, Kinston

PERMITS TO KEEP GAME ANIMALS IN CAPTIVITY

JUNE 30, 1934, TO JUNE 30, 1935

A. L. Gore, Bug Hill
 Fred D. Poss, Haysville
 Jack Sykes, Raleigh
 Edd Davis, Toecane
 Miss Mildred Houle, Wing
 Biltmore Estate, Biltmore
 W. A. Marlow, Fairview
 John Elrath, Swannanoa
 Frank Russell, Havelock
 O. W. Ponder, Skyland
 J. W. Case, Candler
 B. B. Paul, New Bern
 Wallace Tweed, White Rock
 Russell McKinley, Washington
 Wayne Brigman, Marshall
 Jeter Smith, Marshall
 Mrs. Lizzie Harrell, Coarpeake
 L. C. Stevens, Lumberton
 Charles Williams, Fairmont
 Mrs. Laddie McGaha, Canton
 K. P. Lowe, Dellwood
 Harry Barry, Pinebluff
 J. Whitt Freeman, Enka
 Peyton Randolph, Enfield
 J. E. Stepp, Marion
 A. A. Teague, Marion
 Kendall Bros., Guilford
 H. B. Mehaffey, Canton
 George Branch, Proctorville
 Mrs. David Peterson, W. Asheville
 Paul Jacobs, Vanceboro
 Pink Lance, Asheville
 W. C. Hicklin, Skyland
 L. L. Crook, Arden
 W. C. Stewart, Asheville, Route 1
 Raymon Lee Kirkman, Winston-Salem
 D. H. Sharp, Candler

Fred P. West, W. Ashville
 Isaac Freeman, Hendersonville
 Major Rains, Dana
 Clyde S. Brown, Brevard, Route 2

JUNE, 30, 1935, TO JUNE 30, 1936

Joe Foy, Jacksonville
 R. C. Floyd, Fairmont
 A. Ross, Fairmont
 Billie Jenkins, Kinston
 J. P. Sellers, Laurel Hill
 J. L. Propst, Shelby
 W. V. Cahoon, Columbia
 Ralph Wood, Waynesville
 C. R. Heath, Cove City
 C. W. Smith, Laurinburg
 S. H. Overby, Snow Hill
 W. S. Stevens, Tarboro
 A. A. Paul, Rocky Point
 J. E. Price, Greenville
 R. S. Pridgen, Mayesville
 The National Handle Co., Plymouth
 Ralph Penley, Skyland
 Knap Lancaster, Vanceboro
 Edwards Bros. Fur Farm, Whitehead
 P. L. Choate, Sparta
 Carl Quinn, Sparta
 G. S. Eagleson, Lexington
 D. E. Hanes, Linwood
 H. O. Walser, Linwood
 Lee Petteway, Richlands
 Gaston Mann, Manns Harbor
 R. P. Lance, W. Asheville
 D. H. Sharp, Candler
 H. A. Eagle, Old Fort
 J. H. Hyder, Dana
 Dr. W. W. Johnston, Manteo
 Dillard Coleson, Rocky Mount
 Nelson Parker, Tarboro
 W. C. Myers, Burgaw
 W. R. Hale, Eure
 L. T. Parker, Eure
 C. B. Herring, Burgaw
 Biltmore Estate, Biltmore
 J. E. Nixon, E. Laurinburg

COLLECTING PERMITS
(Scientific and Educational Purposes)

JUNE 30, 1934, TO JUNE 30, 1935

J. E. Derrick, Lake Waccamaw
 V. F. Kelly, Jr., Fayetteville
 A. Breckenridge, Chapel Hill
 S. B. Etheridge, Washington
 A. R. Masters, Asheville
 T. G. Samworth, Marines
 F. Bach Sellers, Washington
 Gaston Pearce, Raleigh
 G. F. Ivey, Hickory
 Lees-McRae College, Banner Elk
 W. S. Crain, Poplar Branch
 Harold S. Peters, Washington, D. C.
 Clarence Cottam, Washington, D. C.
 Reinard Harkema, Duke University, Durham
 Alden L. Whiteside, Weaverville
 H. B. Teague, Asheville
 Dr. Ben F. Royal, Morehead City
 Ethel B. Finster, Asheville
 Leland J. W. Jones, Asheville
 Harry T. Davis, Raleigh
 H. H. Brimley, Raleigh
 W. A. Nesbitt, Arden
 G. Robert Luns, Jr., Charleston, S. C.
 A. Wetmore, Washington, D. C.
 Edw. I. Williams, Fairmont
 R. M. McKenzie, Gastonia
 Biltmore Estate, Biltmore
 Henry O. Havemeyer, New York, N. Y.

JUNE, 30, 1935, TO JUNE 30, 1936

E. E. Brown, Ithaca, N. Y.
 Dr. J. L. Sallon, Raleigh
 Ross O. Stevens, High Point
 W. Howard Ball, Washington, D. C.
 T. D. Burleigh, Asheville
 A. L. McKinney, Asheville
 Arnold Breckenridge, Chapel Hill
 Eugene P. Odum, Chapel Hill
 S. A. Ogden, Fountain City, Tenn.
 Ira M. Gabrielson, Washington, D. C.
 Dr. Ben F. Royal, Morehead City
 Gaston Pearce, Raleigh
 Ethel Finster, Asheville
 Harry T. Davis, Raleigh
 H. H. Brimley, Raleigh

V. F. Kelly, Jr., Fayetteville
 Reinard Harkema, Duke University, Durham
 A. P. Chippy, St. Augustine College, Raleigh
 H. S. Peters, Washington, D. C.
 J. E. Derrick, Warrenton
 Clarence Cottam, Washington, D. C.
 A. Wetmore, Washington, D. C.
 Frazier Poole, Salisbury
 G. Robert Lunz, Jr., Charleston, S. C.
 W. A. Nesbitt, Asheville
 Edw. I. Williams, Fairmont
 O. M. Litaker, Charlotte
 Douglas R. Potter, New York, N. Y.
 James S. Gutsell, U. S. Bureau of Fisheries, Beaufort
 M. D. Hart, Richmond, Va.
 Henry D. Havemeyer, New York, N. Y.
 A. H. Howell, Washington, D. C.
 Harold H. Bailey, Miami, Fla.
 V. F. Kelly, Jr., Fayetteville
 S. A. Walker, Manteo
 Miss Ethel B. Finster, Asheville
 E. V. Floyd, High Point
 Roxie Collie, Raleigh
 Frazer G. Poole, Salisbury
 Robert B. Wallace, Asheville
 George B. Becker, Reidsville
 A. Wetmore, Washington, D. C.

GAME LAW PROSECUTIONS

	No. of Cases	Fines	Costs
July 1, 1934 to June 30, 1935-----	902	\$1,805.56	\$5,989.91
July 1, 1935 to June 30, 1936-----	1,994	3,598.96	14,442.09

INLAND FISHERIES

During the biennium just ended, we have had an opportunity largely through WPA assistance to improve the hatcheries, which are located at Fayetteville, Waynesville, Roaring Gap, Boone, Marion and South Toe River. Much-needed repairs have been made to the buildings and improvements have been made to the pools and grounds. The capacity of the Fayetteville Hatchery will be considerably increased next year by the addition of two large breeding pools being built by WPA. Marion, Roaring Gap and Waynesville also have projects in the process of being completed, which will add materially in the productiveness of these hatcheries.

The policy, established in 1934, of rearing most of the trout to fingerling size before beginning distribution has been continued. This has proved

highly successful and satisfactory to the followers of trout fishing and has resulted in an increase in the trout population. The mortality rate in the planting of fingerling trout is much less than that resulting from planting of smaller fish; consequently much better results are obtained.

The dam at Lake Rim which was washed out during high waters in the spring of 1935, has been restored with a fine structure that should last for many years. The breaking of this dam just previous to the spawning season in 1935, somewhat curtailed the production at the Fayetteville Hatchery for that year.

Fishing has perhaps increased more during the past few years than any other type of outdoor recreation, thus creating a problem that must be met by using every available means to maintain and increase the quantity of game fish. In this direction, a program was launched in the spring of 1936, to conserve the fish population in some of the clear water Eastern Rivers where sufficient brood stock still remains to repopulate the streams under adequate protection. An area of approximately fifteen miles in each river where breeding conditions were favorable and sufficient wild brood stock available therein was closed. These areas were closed during the entire spawning season and were properly posted and patrolled daily by special protectors equipped with outboard motor and boat. This method of natural fish culture was applied to areas on the following rivers: Lumber, Waccamaw, Black, Northeast Cape Fear, New, Trent and Little Alligator. The plan proved very successful in the production of a new crop of fish and the people coöperated in an excellent manner in observing the regulations as to the closed areas. This program, in view of its success, is to be continued in 1937 and extended, as far as revenue will permit, to other streams.

Many of the Inland Fisheries problems of the State cannot be met at this time because of the limited revenue from the sale of fishing licenses. If a County License could be collected in every county in the State, ample revenue would be provided to meet the problems; but at the present time only twenty-three out of the one hundred counties of the State require a County License.

During the past biennium, the U. S. Bureau of Fisheries, realizing our needs has come into the picture with greater coöperation than ever before. Previous to 1934, the only federal hatchery in the State was located at Edenton, but in addition to that a federal trout hatchery is just being completed on Oconolufy Creek near Smokemont, in Swain County; and the largest warm water fish hatchery in the Southeast is in the process of completion on the Sandhills Resettlement area (N. C. 3). This hatchery is to be operated by the Bureau of Fisheries; in fact, its representative is now in charge. The hatchery will have twenty breeding ponds of one acre each (10 of which are now completed) with two rearing ponds of two and one-half acres each and a rearing lake of approximately seventy acres. These additional federal facilities will help considerably in repopulating the streams of the State, but we are still far short of being able to carry out the restocking program necessary to maintain the proper game fish supply in our streams, and are taking this occasion to repeat the recommendation made in our report to the 1935 legislature; namely, that the County Fishing License be required in all counties so as to enable the Department to keep abreast of the requirements of the people in the fish work.

1934 FISHING LICENSE SALES

COUNTY	Non-Resident	State	County	Non-Resident Permit (Daily)	County Permit (Daily)	Total
Alamance		69				\$ 138.00
Alexander		17				34.00
Alleghany		14	69	3	2	99.50
Anson		20				40.00
Ashe	1	11	147	17		182.50
Avery	5	87	165	180	110	509.00
Beaufort		19		6		41.00
Bertie		6		3		13.50
Bladen		13		1		26.50
Brunswick		5		4		12.00
Buncombe	12	848	376	69	7	2,170.00
Burke		149	419	227	53	857.00
Cabarrus		39				78.00
Caldwell		153	219			525.00
Camden						
Carteret						
Caswell						
Catawba	1	80		1		165.50
Chatham		5				10.00
Cherokee	4	143	37	19	10	357.50
Chowan		1				2.00
Clay	4	29	27	4		107.00
Cleveland		141		5		284.50
Columbus	4	71		211		267.50
Craven		49		40		118.00
Cumberland		32				64.00
Currituck		1		2		3.00
Dare						
Davidson		60		4		122.00
Davie		1				2.00
Duplin		16				32.00
Durham		94				188.00
Edgecombe		73				146.00
Forsyth		237				474.00
Franklin		19				38.00
Gaston		62				124.00
Gates		6		2		13.00
Graham	26	38		2,000	20	1,216.00
Granville		11				22.00
Greene		18		1		36.50
Guilford	1	121				247.00
Halifax	3	55		20		135.00
Harnett		64				128.00
Haywood	2	278	448	46	70	1,072.00
Henderson	21	180	237	1,684		1,544.00
Hertford		6				12.00
Hoke		4				8.00
Hyde		232		53		490.50
Iredell		81				162.00
Jackson	7	85	108	136		381.00
Johnston		69				138.00
Jones		2				4.00
Lee		29		8		62.00
Lenoir	3	175		20		375.00

1934 FISHING LICENSE SALES—Continued

COUNTY	Non-Resident	State	County	Non-Resident Permit (Daily)	County Permit (Daily)	Total
Lincoln.....		46			1	92.00
Macon.....	3	42	180	43		301.00
Madison.....	2	23				56.00
Martin.....		23		6		49.00
McDowell.....		70	209	124	42	432.00
Mecklenburg.....		120		3		241.50
Mitchell.....		66	9	5		143.50
Montgomery.....		40				80.00
Moore.....	1	9		6		26.00
Nash.....		27				54.00
New Hanover.....		61				122.00
Northampton.....		37				74.00
Onslow.....		2		7		7.50
Orange.....		37				74.00
Pamlico.....		1				2.00
Pasquotank.....	1	4				13.00
Pender.....		14		2		29.00
Perquimans.....						
Person.....		8				16.00
Pitt.....		78		7		159.50
Polk.....	26	69	148	803		817.50
Randolph.....		30				60.00
Richmond.....		57		4		116.00
Robeson.....		38				76.00
Rockingham.....		18				36.00
Rowan.....		40				80.00
Rutherford.....	1	112		186	20	332.00
Sampson.....		11				22.00
Scotland.....		8				16.00
Stanly.....		57		2		115.00
Stokes.....		9				18.00
Surry.....		5				10.00
Swain.....	2	61	145	64		309.00
Transylvania.....	6	35	87	64	5	221.50
Tyrrell.....		4		1		8.50
Union.....		6				12.00
Vance.....		8				16.00
Wake.....	2	177		2		365.00
Warren.....		9				18.00
Washington.....	1	1				7.00
Watauga.....		33	104	13	7	180.00
Wayne.....		123				246.00
Wilkes.....		34	93	1	30	176.50
Wilson.....		114				228.00
Yadkin.....		1				2.00
Yancey.....		18	39	3	5	79.00
Miscellaneous Sales.....	4	5		1		30.50
Total.....	143	5,809	3,266	6,113	382	\$18,846.50
Mattamuskeet Lake.....						30.00
Western Refuges.....						651.00
Grand Total.....						\$19,527.50

1935 FISHING LICENSE SALES

COUNTY	Non-Resident	State	County	Non-Resident Permit (Daily)	State Permit (Daily)	Total
Alamance.....		45			37	\$ 108.50
Alexander.....		28			13	62.50
Alleghany.....	1	14	70		3	104.50
Anson.....		37			20	84.00
Ashe.....		9	98	3	4	121.00
Avery.....	20	91	181	147	134	637.00
Beaufort.....	1	30		8	11	76.00
Bertie.....		27		2	9	60.50
Bladen.....		27		1	22	66.00
Brunswick.....	1	1				7.00
Buncombe.....	11	795	253	22	50	1,943.00
Burke.....	1	203	414	58	304	1,024.00
Cabarrus.....		83			1	166.50
Caldwell.....		205	445	21	8	874.00
Camden—see Pasquotank						
Carteret.....		2				4.00
Caswell.....						
Catawba.....		78			4	158.00
Chatham.....		6				12.00
Cherokee-Clay.....	9	122	58	20	29	375.50
Chowan.....		1				2.00
Clay—see Cherokee						
Cleveland.....		133			10	271.00
Columbus.....	3	62		35	403	366.00
Craven.....	3	30		28	23	109.50
Cumberland.....		49			19	107.50
Currituck.....						
Dare.....						
Davidson.....		54		3	27	123.00
Davie.....		2				4.00
Duplin.....		22		1	4	46.50
Durham.....		81			13	168.50
Edgecombe.....	1	103		10	19	229.50
Forsyth.....		319			22	649.00
Franklin.....		7				14.00
Gaston.....		62			2	125.00
Gates.....	4	2		17	6	43.00
Graham.....	165	43		813	137	1,750.00
Granville.....		22				44.00
Greene.....		24		1	10	54.00
Guilford.....		167			6	337.00
Halifax.....		61		5	4	126.50
Harnett.....		71			32	158.00
Haywood.....	7	371	559	44	26	1,382.00
Henderson.....	74	191	250	638	23	1,509.50
Hertford.....		18			12	42.00
Hoke.....		20				40.00
Hyde.....	1	185		68	472	662.50
Iredell.....		67			11	139.50
Jackson.....	26	94	90	96	18	495.50
Johnston.....		44			20	98.00
Jones.....		7			6	17.00
Lee.....		24			9	52.50
Lenoir.....	2	214		17	74	485.00
Lincoln.....		60			1	120.50

1935 FISHING LICENSE SALES—Continued

COUNTY	Non-Resident	State	County	Non-Resident Permit (Daily)	State Permit (Daily)	Total
Macon.....	11	57	173	27	30	\$ 377.50
Madison.....	5	27	24	4	1	105.50
Martin.....		31		2	2	64.00
McDowell.....	4	101	294	53	83	603.50
Mecklenburg.....		166			13	338.50
Mitchell.....		82	81	2	19	256.50
Montgomery.....		108		1	23	228.50
Moore.....	1	13		3	2	35.00
Nash.....		32			6	67.00
New Hanover.....		54		9	11	118.00
Northampton.....		39			5	80.50
Onslow.....		3			3	7.50
Orange.....		32		4	9	70.50
Pamlico.....						
Pasquotank—Camden.....	2	4				18.00
Pender.....		14		1	10	34.00
Perquimans.....						
Person.....		4				8.00
Pitt.....		153		9	27	325.00
Polk.....	57	59	187	550	47	994.50
Randolph.....		18				36.00
Richmond.....	10	71		8	35	215.50
Robeson.....		23		1	2	48.10
Rockingham.....		19				38.00
Rowan.....		20			12	46.00
Rutherford.....	9	215	80	120	111	725.50
Sampson.....		23			1	46.50
Scotland.....		9			2	19.00
Stanly.....		57			1	114.50
Stokes.....		5			3	11.50
Surry.....		6				12.00
Swain.....	10	87	235	71	49	538.50
Transylvania.....	6	31	88	66	15	240.50
Tyrrell.....		18		1	12	42.50
Union.....		8			5	18.50
Vance.....		20			2	41.00
Wake.....	1	118				241.00
Warren.....		6				12.00
Washington.....		4		4	6	13.00
Watauga.....	1	52	97	29	11	237.00
Wayne.....		119			34	255.00
Wilkes.....		22	25		40	90.00
Wilson.....		149	10		35	320.50
Yadkin.....						
Yancey.....		51	122	5	20	237.50
Miscellaneous sales.....	14	2		1	4	77.00
Total.....	461	6,545	3,834	3,029	2,749	\$23,064.60
Mattamuskeet Lake.....						\$ 1,000.25
Western Refuges.....						646.00
Grand Total.....						\$24,710.85

DISTRIBUTION OF FISH FROM HATCHERIES

The following table shows the number of fish distributed from the various State hatcheries during the Biennium:

Boone Hatchery, Boone, N. C.

	Brook Trout	Rainbow Trout	Brown Trout
July 1, 1934 to Dec. 31, 1934.....	130,000	174,000	78,000
Jan. 1, 1935 to June 30, 1935.....	23,000	-----	60,000
Total.....	153,000	174,000	138,000
July 1, 1935 to Dec. 31, 1935.....	164,000	120,000	155,000
Jan. 1, 1936 to June 30, 1936.....	72,000	70,000	34,000
Total.....	236,000	190,000	189,000

Frank Stedman Hatchery, Fayetteville, N. C.

	Bass	Bream	Crappie
July 1, 1934 to Dec. 31, 1934.....	9,441	18,118	-----
Jan. 1, 1935 to June 30, 1935.....	7,156	485	-----
Total.....	16,597	18,603	-----
July 1, 1935 to Dec. 31, 1935.....	1,795	36,275	400
Jan. 1, 1936 to June 30, 1936.....	39,120	2,605	1,330
Total.....	40,915	38,880	1,730

Morrison Fish Hatchery, Waynesville, N. C.

	Brook Trout	Rainbow Trout	Brown Trout
July 1, 1934 to Dec. 31, 1934.....	321,700	103,000	-----
Jan. 1, 1935 to June 30, 1935.....	215,150	11,550	-----
Total.....	536,850	114,550	-----
July 1, 1935 to Dec. 31, 1935.....	142,000	202,000	167,000
Jan. 1, 1936 to June 30, 1936.....	77,500	66,600	-----
Total.....	219,500	268,600	167,000

"Pete" Murphy Fish Hatchery, Marion, N. C.

	Brook Trout	Rainbow Trout	Brown Trout	Bream	Bass
July 1, 1934 to Dec. 31, 1934.....	144,000	336,000	55,000	86,000	68,100
Jan. 1, 1935 to June 30, 1935.....		350,000	75,000	2,000	20,000
Total.....	144,000	686,000	130,000	88,000	88,100
July 1, 1935 to Dec. 31, 1935.....	61,000	115,000	9,400	130,200	28,600
Jan. 1, 1936 to June 30, 1936.....		227,000	295,000	150	335,000
Total.....	61,000	342,000	304,400	130,350	363,600

Roaring Gap Fish Hatchery, Roaring Gap, N. C.

	Brook Trout	Rainbow Trout	Brown Trout
July 1, 1934 to Dec. 31, 1934.....	195,740	581,800	475,258
Jan. 1, 1935 to June 30, 1935.....	22,000	29,736	67,000
Total.....	217,740	611,536	542,258
July 1, 1935 to Dec. 31, 1935.....	253,800	413,200	67,436
Jan. 1, 1936 to June 30, 1936.....	28,000		
Total.....	281,800	413,200	67,436

South Toe River Hatchery, Busick, N. C.

	Brook Trout
From July 1, 1934 to June 30, 1936.....	200,000

Edenton Fish Hatchery (Federal), Edenton, N. C.

	Bass	Bream
June 30, 1935 to Dec. 31, 1935.....	200	2,300
Jan. 1, 1936 to June 30, 1936.....	13,500	
Total.....	13,700	2,300

FISH LAW PROSECUTIONS

	No. of Cases	Fines	Costs
July 1, 1934 to June 30, 1935-----	998	\$935.95	\$5,771.00
July 1, 1935 to June 30, 1936-----	1,335	1,740.70	7,781.55

DIVISION OF MINERAL RESOURCES

The work accomplished by the Division of Mineral Resources of the Department of Conservation and Development during the past biennium may be divided into two groups: A, Office Work; B, Field Work.

OFFICE WORK

The office work of the Division may be divided into six chief types:

1. A great number of requests has been received for information on the various mineral deposits of the State. Many available publications have been forwarded to parties requesting information on particular deposits. In addition, the State Geologist has compiled and prepared reports on a number of the deposits. Some of these reports have been instrumental in getting new mining operations started.

2. During the past two years approximately four hundred samples of minerals were received in the office and reported on. The identification of samples is greatly hampered because of the lack of laboratory facilities. In cases where the minerals were not easily identified, verifications have been made by the U. S. Bureau of Mines and commercial laboratories.

3. During the biennium three publications have been in preparation, two completed and one unfinished. A report has been prepared on the gold deposits of the State, and has been published as Bulletin No. 38. This report is more or less a reprint of the preëxisting reports on the more important gold mines of the State, with recent information compiled and prepared by the State Geologist. Several hundred requests have already been received for copies of this publication. Three thousand copies have been printed.

Another publication, "A Rock and Mineral Guide of North Carolina," has been completed and is ready for publication. It will be published as Educational Series No. 2. This publication describes briefly the physiography, the rock formations, the distribution of the more important formations, and economic uses; a brief description, and more important locations where found; and the economic uses of each mineral. This publication will be of special interest to high school and college students. It is written entirely for educational purposes, and not from an economic standpoint.

There is also in preparation "The Mineral Industry in North Carolina," from 1929 to 1935, inclusive, which will be published as Economic Paper No. 64.

4. The Division has also continued its coöperative work with the U. S. Bureau of Mines and the U. S. Bureau of Census, collecting and indexing statistics of the State's mineral production. These statistics will be included in Economic Paper No. 64.

FIELD WORK

Nickel Deposits. During the past two-year period a great number of samples have been taken from the nickel deposits in Jackson County. Also, considerable geologic work has been done in that section to determine the

extent of the deposits. The chemical analyses show a rather low nickel content, but may eventually be of commercial importance. The investigations reveal rather extensive areas showing many millions of tons with a nickel content from .21 to 14.2 per cent. An average, however, is very low, usually below 1 per cent.

Gold Deposits. Considerable investigations have been made relative to the gold deposits throughout the State. A great many of these deposits, including many of the old mines, were visited; and a great many samples of the ore taken. The most important work accomplished was at the Portis Mine, in the northeastern gold belt.

Other mines visited were the Keystone, Sawyer, Empire, Southern Homestake, and Hoover Hill, in Randolph County; the Parker, Thompson, and Crowell Mines, in Stanly County; Allen Furr, Snyder, Rocky River, Gold Hill, Whitney, and Isenhour, in Cabarrus County; the Rudisil and Capps Mines, in Mecklenburg County; the Howie Mine, in Union County; the Gibson Hill, in Alamance County; as well as several mines of lesser importance in Moore and Montgomery Counties. Reports were prepared covering the Keystone, Parker, Thompson, Allen Furr, Snyder, and the Capps properties. The Division was instrumental in interesting mining companies in the Keystone, Snyder, Thompson, Parker, and the Capps Mines. Investigations are now being conducted by the mining companies. A mill has already been erected at the Portis, Keystone, Allen Furr, Thompson, Crowell, Snyder, and Rudisil; and plans are under way for the erection of mills at the Capps, Howie, and Gibson Hill Mines.

Limestone. The Highway Commission requested reports on the limestone deposits in Madison, Cherokee, and McDowell Counties. The Commission finally decided to purchase the Yancey limestone deposit, in McDowell County, to supply limestone with convict labor for highway repair and construction work.

Feldspar. Numerous deposits of feldspar were visited in Ashe, Jackson, and Swain Counties. Some very large and important deposits were reported upon in Swain and Ashe Counties.

Vermiculite. Several vermiculite deposits were visited and examined in Jackson, Clay, Macon, Yancey, and Mitchell Counties. Some very good deposits were found and reported upon in Clay and Macon Counties.

Mica. A scrap mica deposit was investigated and reported upon in Yancey County. Plans are under way for the erection of a recovery plant.

Kaolin. Some very good kaolin deposits were examined and reported upon in Avery County. Two very large deposits were examined, one of which revealed about twenty million tons of recoverable clay, and the other about two million tons. As a result of these investigations, clay washing plants are now under construction. Research, conducted by the Tennessee Valley Authority, has shown that the North Carolina clays, in some respects, are the most outstanding clays ever discovered.

Ilmenite. As a result of increased interest in ilmenite, deposits of this mineral have been discovered and reported upon in Ashe, Caldwell, and

Jackson Counties. The National Lead Company is core-drilling the deposit in Caldwell County. If it proves to be of value, a new mineral industry will be established in the State. Samples of rutile sands have also been identified from Albemarle Sound.

Well Locations. The State Geologist has coöperated with the PWA, the State Board of Health, County Superintendents, the Highway and Public Works Commission, State institutions, towns, and private corporations in making well locations for water supplies for public and private institutions. Wells were located at the following places:

For the PWA, locations were made at Pilot Mountain, Mt. Gilead, Blowing Rock, Jackson, Winton, Randleman, Whitakers, Biscoe, Norwood, and Yanceyville. A total of eighteen wells was located for these towns.

For State institutions, wells were located at the following places: Samar-cand Manor, Dix Hill, and the Blind School.

For the Highway Commission, locations were made at Central Prison, Rowan, Halifax, Gates, and Washington Counties.

Wells were also located at the Homestead property west of Raleigh, at the Guilford Battle Ground National Military Park, and for two CCC camps.

Wells were also located for schools as follows: four in Yadkin County, four in Rockingham County, six in Rowan County, one in Forsyth, one in Chatham, four in Wayne, and one in Alamance. Wells were located for the towns of Cary and Elon College.

Well sites were chosen for mills as follows: two at Mayodan, two at Draper, three at Haw River, two at Central Falls, three at Burlington, three in Avery County, one in Macon, one at Oakboro, two at Greensboro, two at Winston-Salem, and one at High Point.

A total of seventy-six wells was located during the past biennium.

RECOMMENDATIONS

On account of the renewed interest in gold mines in North Carolina, a State geological map should be published. Such a map has been compiled, but funds have not been made available for its publication. The last geological map was published in 1896.

Funds should also be appropriated to prepare and publish reports covering recent investigations on the kaolin, feldspar, kyanite, talc, vermiculite, and olivine deposits. Considerable interest has been shown in these non-metallics during the last year, but no reports are available covering such deposits.

On account of the proposed coöperation between the Tennessee Valley Authority, the United States Bureau of Mines, and the Division of Mineral Resources of the Department of Conservation and Development, additional funds will be necessary for this program. S. T. Henry and Dr. R. E. Gould, of the Tennessee Valley Authority, have offered the coöperation of the personnel of the Ceramic Department at Norris, Tenn., for this coöperative work. Also, through Col. J. W. Harrelson, Administrative Dean of State College; Dr. Harry Tucker, Head of the State College Experiment Station; and Dr. J. L. Stuckey, Head of the Department of Geology, State College, the facilities of these Departments have been offered for this work.

In order to carry on this work as it should be done, additional personnel, including a laboratory man and one field man, should be employed. Also, additional travel expense and a fund for certain equipment necessary should be provided. After the information has been compiled, it should be published in pamphlet form to be distributed to anyone interested in the development of the natural resources of North Carolina. For this program an additional \$8,000 per year for the next biennium is therefore requested.

The Division is requesting an appropriation of \$7,960 to carry on the regular work of the Department. In addition, a special fund of \$8,000 per year, during the next biennium, has been requested for preparing reports, not available at this time, on mineral deposits.

DIVISION OF WATER RESOURCES AND ENGINEERING

INTRODUCTION

Several significant changes have taken place which have had their effects on the work of this Division during this biennium. During the early part of 1935, the headquarters of this Division were moved from Chapel Hill to Raleigh. Through the generosity and coöperation of Col. J. W. Harrelson, Dean of Administration of N. C. State College, and Dr. W. C. Riddick, Dean of the School of Engineering, space was provided in the Physics-Electrical Engineering Building on the campus of the college. This makes for greatly increased efficiency, because of the closer contact with other offices of the Department, with science and engineering departments of the State College until of the University of North Carolina, and other State offices.

In March, 1935, H. D. Panton, then Chief Engineer of the Division, terminated his service with the Department, and Prof. Theodore S. Johnson, of the faculty of N. C. State College, was temporarily engaged as Engineer-Consultant for the Division on a part-time basis, while the administrative details were carried out by H. J. Bryson, State Geologist.

In July, 1935, Mr. Johnson was engaged permanently as Chief Engineer of the Division, dividing his time equally between the Department of Civil Engineering at N. C. State College and the Division.

It is felt that this will work to the good of both the college and the Division, and makes possible the employment of an Assistant Engineer for the Division.

This position was filled in September, 1935, by the appointment of Carroll L. Mann, Jr. W. H. Riley and F. E. Day are serving as Assistant Engineers, devoting most of their time to work in connection with the coöperative program of stream gaging. Mr. Riley has general supervision over all gaging stations in the eastern part of the State, with headquarters in Raleigh. Mr. Day is assigned to the Geological Survey office in Asheville, N. C. The Division also pays for the services of a stenographer in this office. Miss Dorothy Lindsey has been serving as Secretary to the Division since September 15, 1935.

In order to coöperate with the work of the National Resources Committee and the North Carolina State Planning Board in the special study of water resources of the State and nation, Mr. Mann has been granted a temporary leave of absence, to serve as Senior Water Technician. Under his direction special studies have been made of each of the Drainage Basins of the State draining to the Atlantic Ocean. These studies have consisted of comprehensive and summary reports on the water resources, and have been done in coöperation with the States of Virginia and South Carolina, and the District Water Consultant, William M. Piatt, of Durham.

During the summer of 1936, William W. Lewis, of Duke University, has been temporarily engaged as Assistant Engineer, devoting his time to preparation of these reports.

STREAM GAGING

The major, and perhaps the most important, regular activity of the Division is the work of maintaining and operating stream gaging stations on all the watersheds of the State, for the purpose of measuring the daily variations and the total quantity of water flowing in the streams. This work is carried on in coöperation with the U. S. Geological Survey, under the immediate direction of E. D. Burchard, District Engineer, with headquarters in Asheville. During the previous biennium there was a considerable expansion in the number of stream gaging stations. This work was largely completed prior to the period covered by this report. However, during this period 11 new stream gaging stations have been established and records are now being taken on 95 stations. At the beginning of the biennium there were in operation 84 stations, at that time the largest number of such stations in operation at one time in the State. Of these 84 stations, 80 were automatic recorder type stations, 71 being of permanent construction. During this biennium several of the timber automatic recorder type stations were reconditioned. Of the 84 stations noted above, which were in operation or under construction as of June 30, 1934, 72 were operated and maintained on a coöperative basis by this Department and the U. S. Geological Survey. The remaining 12 were Federal stations, the entire expense of operation of which was paid from Federal funds.

During the biennium reported herein no stations were discontinued, and the following stations were installed:

River	Station	Date of Installation	Co-operation
Hiwassee.....	Near Vest, N. C.....	9- 1-34	Dept.-T.V.A.
Elk Creek.....	Near Elk Park, N. C.....	10- 9-34	Dept.-T.V.A.
Elk Creek.....	Near Banners Elk, N. C.....	10-20-34	Dept.-T.V.A.
Catawba.....	Near Catawba, N. C.....	11- 4-34	Dept.-Weather Bureau
Tar River.....	At Greenville, N. C.....	3-24-35	Dept.-Weather Bureau
French Broad.....	At Rosman, N. C.....	1- 1-36	Department
Nottely.....	Near Murphy, N. C.....	2-17-36	Dept.-T.V.A.
Noland Creek.....	Near Bryson, N. C.....	10- 1-35	Dept.-T.V.A.
Little Brown Creek..	Polkton, N. C.....	10-25-35	Dept.-U.S.G.S.
Brown Creek.....	Near Polkton, N. C.....	10-26-35	Dept.-U.S.G.S.
North Fork Jones Cr..	Near Wadesboro, N. C.....	10-26-35	Dept.-U.S.G.S.

Of the 95 stations operated as of June 30, 1936, 88 were constructed by the State of North Carolina, 4 by licensees and permittees of the Federal Power Commission, 2 by the U. S. Weather Bureau, and 1 by individuals. From a standpoint of maintenance and operation, 7 of these stations are operated jointly with the Corps of Engineers, U. S. Army, 40 under a coöperative agreement with the Tennessee Valley Authority, and 5 by the U. S. Soil Conservation Service.

Stream gaging work is by the very nature of the problem a continuing activity, which must be carried on without interruption over a considerable period of time if the true yield and capacity of a stream is to be determined and if its flow characteristics are to be known with any degree of assurance. This is increasingly so, because the record to be worthy of consideration must cover long dry periods as well as periods of maximum rainfall and run-off. It is generally regarded that a period of not less than 30 years should be provided. At the present time there are on North Carolina streams approximately 5 stations with records of more than 30 years; 10 records of 10 to 29 years; 69 records of from 1 to 10 years; and 6 records of less than one year, of stations recently established. This represents a very creditable collection of records, one which it is imperative to maintain, if it is to have any value.

It is apparent to any student of the State and its future that the problem of water supply for cities, towns, and industries is one that daily grows more acute. In the very near future, steps must be taken to safeguard the supplies for the rapidly developing urban centers in the Piedmont, as well as a very large number of new supplies for cities throughout the whole State. In addition to this, there are many potential sites for the development of small power installation, and many situations which lend themselves admirably to the development of a large number of small lakes for recreation and for the raising of fish. At the present time, there is a great need for data on stream flow and run-off on such small areas, as well as a need for further and comprehensive stream flow records on the larger streams. If, therefore, the data which are absolutely necessary for sound development and true conservation of these resources be obtained, this program of stream gaging must continue to receive even greater attention than it has in the past.

At the present time the funds, which are made available through these various agencies, are not nearly sufficient to insure a full rounded program. Even if there is to be no increase in the number of stations, additional funds must be provided if the stations are to be adequately maintained and repaired and are to be given the regular superintendence which such stations require. In order for the discharge of the stream to be known, rating curves for each station must be determined, and these are based upon actual current meter discharge measurements at various rising and falling stages in the stream. It will be noted above that many of the stations are of less than three or four years, and insufficient measurements have been made on many of these stations to arrive at a rating curve. This requires more field work on the part of the observers, and adds further tasks to the personnel employed.

Not only must additional field work be done, but a correspondingly increased amount of office computation and work of preparation of the finished records, the adjusting of old records, and special computations where some change has taken place in the hydraulic conditions obtaining at the stations.

The appropriation made during the past biennium was \$3,150.00 for the year ending June 30, 1936, and \$3,500.00 for the year ending June 30, 1937. It is urgently recommended that the appropriation for this special coöperative account be set at not less than \$5,000.00 for each of the years of the succeeding biennium. Under Table 1 below will be found a complete list of all stream gaging stations in operation in North Carolina as of June 30, 1936.

TABLE 1

STREAM GAGING STATIONS IN OPERATION IN NORTH CAROLINA, JUNE 30, 1936

River and Station	Established	Co-operation
Broad River near Boiling Springs	6-26-25	N.C.D.C.D.-U.S.G.S.
Broad River near Chimney Rock	3-10-27	N.C.D.C.D.-U.S.G.S.
(Second) Broad at Cliffside	6-20-25	N.C.D.C.D.-U.S.G.S.
Brown Creek near Polkton	10-26-35	N.C.D.C.D.-U.S.G.S.
Buffalo Creek near Greensboro	8-30-28	N.C.D.C.D.-U.S.G.S.
North Buffalo Creek near Greensboro	8-27-28	N.C.D.C.D.-U.S.G.S.
Cape Fear River at Fayetteville	1- 1-89	U.S.G.S.-Fed. Type
Cape Fear River at Lillington	12- 6-23	N.C.D.C.D.-U.S.A.E.
Catawba River at Catawba	11- 4-34	N.C.D.C.D.-U.S.W.B.
Contentnea Creek at Hookerton	11-23-28	U.S.G.S.-Fed. Type
Contentnea Creek near Wilson	2-27-30	N.C.D.C.D.-U.S.A.E.
Dan River near Francisco	8-16-24	N.C.D.C.D.-U.S.G.S.
Dan River at Leaksville	7-11-29	N.C.D.C.D.-U.S.G.S.
Deep River (East Fork) near High Point	7-27-28	N.C.D.C.D.-S.C.S.
Deep River (West Fork) near High Point	6-14-23	N.C.D.C.D.-S.C.S.
Deep River at Moncure	5- 5-98	N.C.D.C.D.-U.S.A.E.
Deep River at Ramseur	11-24-22	N.C.D.C.D.-U.S.G.S.
Deep River near Randleman	9- 8-28	N.C.D.C.D.-S.C.S.
Dial Creek at Bahama	10- 9-25	N.C.D.C.D.-U.S.G.S.
Eno River at Hillsboro	11-21-27	N.C.D.C.D.-U.S.G.S.
Fisher River near Copeland	10- 8-31	U.S.G.S.-N.C.D.C.D.
Fishing Creek near Enfield	8-21-19	U.S.G.S.-Fed. Type
Flat River at Bahama	7-16-25	N.C.D.C.D.-U.S.G.S.
Flat River at Dam near Bahama	3- 9-25	N.C.D.C.D.-U.S.G.S.
Haw River near Benaja	10- 5-28	N.C.D.C.D.-U.S.G.S.
Haw River at Haw River	10-23-28	N.C.D.C.D.-U.S.G.S.
Haw River near Pittsboro	11-26-28	N.C.D.C.D.-U.S.A.E.
Horsepen Creek near Battle Ground	11- 9-25	N.C.D.C.D.-U.S.G.S.
Jones Creek (North Fork) near Wadesboro	10-26-35	N.C.D.C.D.-U.S.G.S.
Linville River at Branch	6- 7-22	N.C.D.C.D.-U.S.G.S.
Little Brown Creek near Polkton	6-25-35	N.C.D.C.D.-U.S.G.S.
Little Sugar Creek near Charlotte	7-31-24	N.C.D.C.D.-U.S.G.S.
Little River near Princeton	2-28-30	N.C.D.C.D.-U.S.A.E.
Lower Little River at Linden	11-22-28	N.C.D.C.D.-U.S.A.E.
Lumber River at Boardman	9-18-29	U.S.G.S.-Fed. Type
Mayo River near Price	7-13-29	N.C.D.C.D.-U.S.G.S.
Muddy Creek near Archdale	8- 6-34	N.C.D.C.D.-S.C.S.
Neuse River near Clayton	7-20-27	N.C.D.C.D.-U.S.A.E.
Neuse River near Goldsboro	2-25-30	
Neuse River at Kinston	2-26-30	N.C.D.C.D.-U.S.A.E.
Neuse River near Northside	7-27-27	N.C.D.C.D.-U.S.G.S.
Pee Dee River near Rockingham	9-27-27	N.C.D.C.D.-U.S.G.S.
Reedy Fork Creek near Gibsonville	9- 7-28	N.C.D.C.D.-U.S.G.S.
Roanoke River at Roanoke Rapids	2-18-30	N.C.D.C.D.-U.S.G.S.
		Fed. P. Proj. 916
Rocky River near Norwood	9-30-29	N.C.D.C.D.-U.S.G.S.
Tar River at Greenville	3- 2-35	N.C.D.C.D.-U.S.A.E.
		U.S.W.B.
Tar River at Nashville	10-18-28	U.S.G.S.-Fed. Type
Tar River at Tarboro	7-26-96	N.C.D.C.D.-U.S.A.E.
Uharie River at Trinity	5-16-34	N.C.D.C.D.-S.C.S.
Yadkin River at Wilkesboro	4-12-29	N.C.D.C.D.-U.S.G.S.
Yadkin River at Yadkin College	7-30-28	N.C.D.C.D.-U.S.G.S.
S. Yadkin River at Cooleemee	6-16-28	N.C.D.C.D.-U.S.G.S.
Beetree Creek near Swannanoa	2- 6-26	N.C.D.C.D.-T.V.A.
Cane River near Sioux	5-26-34	N.C.D.C.D.-T.V.A.

TABLE 1
STREAM GAGING STATIONS IN OPERATION IN NORTH CAROLINA ,
JUNE 30, 1936—*Continued*

River and Station	Established	Co-operation
Cataloochee Creek near Cataloochee.....	5-11-34	N.C.D.C.D.-T.V.A.
Cullasaja Creek at Cullasaja.....	6-13-07	N.C.D.C.D.-T.V.A.
Cullasaja Creek at Highlands.....	12- 8-27	N.C.D.C.D.-T.V.A.
Davidson River near Brevard.....	12-10-20	N.C.D.C.D.-T.V.A.
Elk Creek near Elk Park.....	10- 9-34	N.C.D.C.D.-T.V.A.
Elk Creek near Banners Elk.....	10-20-34	N.C.D.C.D.-T.V.A.
French Broad River at Asheville.....	9- 2-95	U.S.G.S.-T.V.A. Fed. Type
French Broad River at Bent Creek.....	5-15-34	N.C.D.C.D.-T.V.A.
French Broad River at Blantyre.....	12-11-20	N.C.D.C.D.-T.V.A.
French Broad River at Calvert.....	10-15-24	N.C.D.C.D.-T.V.A.
French Broad River at Hot Springs.....	5-16-34	N.C.D.C.D.-T.V.A.
French Broad River at Rosman.....	1- 1-36	N.C.D.C.D.-U.S.G.S.
Hiwassee River near Hayesville.....	6-13-34	N.C.D.C.D.-T.V.A.
Hiwassee River at Murphy.....	6-23-96	N.C.D.C.D.-T.V.A.
Hiwassee River near Vests.....	9- 1-34	N.C.D.C.D.-T.V.A.
Ivy River near Marshall.....	5- 9-34	N.C.D.C.D.-T.V.A.
Jonathan Creek near Cove Creek.....	5-24-30	N.C.D.C.D.-T.V.A.
Big Laurel Creek near Stackhouse.....	5-10-34	N.C.D.C.D.-T.V.A.
Little Tennessee at Iotla.....	6-27-29	N.C.D.C.D.-T.V.A.
Little Tennessee at Judson.....	6-25-96	N.C.D.C.D.-T.V.A.
Mills River near Mills River.....	9-19-24	N.C.D.C.D.-T.V.A.
Mills River (South Fork) at The Pink Beds.....	2-25-26	N.C.D.C.D.-T.V.A.
Nantahala River at Almond.....	4-16-12	N.C.D.C.D.-T.V.A.
New River (North Fork) near Jefferson.....	10-23-24	N.C.D.C.D.-U.S.G.S.
New River (South Fork) at Crumpler.....	8-12-08	N.C.D.C.D.-U.S.G.S.
Noland Creek near Bryson.....	10- 1-35	N.C.D.C.D.-T.V.A. Philip G. Rust
Nolichucky River at Poplar.....	7-24-25	N.C.D.C.D.-T.V.A.
North Toe River above Spruce Pine.....	5- 8-34	N.C.D.C.D.-T.V.A.
Nottely River below Nottely Dam near Murphy.....	2-17-36	N.C.D.C.D.-T.V.A.
Nottely River near Ranger.....	1-17-01	N.C.D.C.D.-T.V.A.
Oconalufly River at Cherokee.....	1-27-21	N.C.D.C.D.-T.V.A.
Pigeon River at Canton.....	5-25-07	N.C.D.C.D.-T.V.A.
Pigeon River near Hepco.....	7-26-27	N.C.D.C.D.-T.V.A.
Scott Creek at Sylva.....	5-16-28	N.C.D.C.D.-T.V.A.
South Toe River at Newdale.....	5- 9-34	N.C.D.C.D.-T.V.A.
Swannanoa River at Biltmore.....	12- 4-20	N.C.D.C.D.-T.V.A.
Swannanoa River near Black Mountain.....	1-15-26	N.C.D.C.D.-T.V.A.
Tuckasegee River at Bryson.....	11- 7-97	N.C.D.C.D.-T.V.A.
Tuckasegee River at Dillsboro.....	6-15-28	N.C.D.C.D.-T.V.A.
Tuckasegee River at Tuckasegee.....	6-18-34	N.C.D.C.D.-T.V.A.
Valley River at Tomotla.....	6-29-04	N.C.D.C.D.-T.V.A.

POWER STUDIES

Because of restricted funds, activities relating to power studies have been reduced to a minimum during the current biennium. Contact has been maintained with the various public utilities companies in North Carolina, and office copies of maps showing electric generating stations and transmission lines are being maintained, as far as time and personnel will permit.

During this biennium there have been no large power developments undertaken, although the period has been marked by a steady increase of

power generated by public utility power plants. In 1933, the total output of plants, both hydro-electric and steam, was 1,956,893,000 K.W.H. During 1934 the corresponding figure was 1,168,529,000 K.W.H. In 1935, the total electricity produced in North Carolina for public use was 2,319,844,000 K.W.H., which was an increase of 23.1 per cent for the biennium, as compared to a change of 17.3 per cent for the United States as a whole over the same period.

Another very important development which has taken place in the State is the great increase in the number of rural transmission lines, largely due to the activity of the Rural Electrification Administration and sales activities of the power companies. It is highly important that continuous records of this development be maintained by the Department, and every effort will be made to devote considerable office attention to this end. The matter of maintaining these records, not only for the rural lines but for the general transmission lines, is all the more imperative because of the development by the Tennessee Valley Authority. The effect of this development upon North Carolina sources of power is as yet problematical, but it is important that the data relating to this problem should be available and kept up to date in this Division. Plans are now in progress, it is understood, for the development of a large hydro-electric installation on the Hiwassee River near Murphy.

COASTAL STUDIES

During the summer of 1935, work was resumed on studies relating to beach erosion and the maintenance of the inlets through the barrier beaches of North Carolina. A field party was at work along the coast during the entire summer, and cross sections of the beach were re-run at the Wright Memorial Bridge-Rodanthe region, Atlantic Beach and Fort Macon Point, Wrightsville Beach, Caroline Beach, and Fort Fisher. New maps were made of the following inlets: Oregon, New, Moores, Masonboro, and of the area surrounding Forts Macon and Fisher. New profile sheets were drawn for all these sections, and the existing records brought up to date. In 1935, an agreement was reached with the U. S. Beach Erosion Board, whereby a coöperative program of studies relating to beach erosion and inlet control was reinaugurated. Under the terms of this agreement the Beach Erosion Board made a trip of inspection over the entire coast, in June, 1936, and is preparing to carry out additional surveys, studies, aerial photographs of selected areas, and other researches on beach erosion.

During the summer of 1936, a similar survey was made by the Division, covering all the above noted areas, and in addition topographic maps of the area near Hatteras Light were secured.

It should be noted that, largely because of the interest of this Department, an extensive program of sand fixation and erosion control has been undertaken along the Nags Head-Hatteras area by the Civilian Conservation Corps, the Works Progress Administration, and the National Park Service. This, together with work previously done by the Civilian Conservation Corps under its regular program, has resulted in the construction of many miles of brush sand fences and the planting with beach grass of thousands of acres that otherwise would have remained barren and subject

to severe wind erosion. No severe storms have taken place during the biennium herein reported on, and the flow through New Inlet remains approximately what it was two years ago.

Since January, 1933, a coöperative program has been maintained for the collection and analysis of water samples for salinity, taken at several locations in Currituck, Roanoke, and Croatan Sounds. This work is carried on in coöperation with the U. S. Army District Engineers at Norfolk, Virginia, by whom the analyses have been made.

FEDERAL WORKS PROGRAM

During the summer of 1935, this Division spent considerable time preparing a suggested program of development for the coastal area of North Carolina, and prepared estimates and brief to substantiate this program. The program involved the establishment of national parks and forests, the extensive program of erosion control and sand fixation, the building of highway bridges across Albemarle and Croatan Sounds and Alligator River, a bridge across Oregon Inlet, and a highway from Nags Head to Hatteras. Progress is being made in the direction of the development of the proposed national park, bird sanctuaries, erosion control, and certain features of the highway and bridge development. This will mean much to the development of this large section of North Carolina.

COÖPERATION WITH DIVISION OF GAME AND INLAND FISHERIES

At the request of the Division of Game and Inland Fisheries, this Division has assisted in the completion of improvements at Stedman Hatchery, near Fayetteville, N. C. Plans for the construction of a new dam, spillway, and power house at Lake Rim were prepared by this Division, and the construction supervised. This work has now been completed, and the water wheel, stand-by gasoline engine, electric generating equipment, and transmission lines have been put into service. In connection with the establishment of the new water line, certain surveys of farm areas subject to inundation were made, and maps of the area submerged prepared. In coöperation with this Division, preliminary plans were made for the construction of additional rearing pools at the fish hatchery, for brick operating houses and other improvements, which were submitted to the Works Progress Administration and other Federal agencies for approval. Maps, plans, and estimates for this work were prepared by this Division, and the work in connection with certain improvements on the quail hatchery was inspected and supervised by this Division.

COÖPERATION WITH THE STATE PLANNING BOARD

In May, 1936, the North Carolina State Planning Board started active work on a Federal-sponsored Works Progress Administration project, for the collection and publication of data relating to a program of State Planning. This work is very closely associated with the regular work and purposes of this Division, and consequently since that time, coöperation in this work has been the first consideration. This has taken four major emphases.

In connection with the National Resources Committee, special attention has been given to the preparation of comprehensive and summary reports

on the drainage basins of the State emptying into the Atlantic Ocean. This involves a study of all phases of the development of the water resources of these streams, including power, water supply, stream pollution, flood control, navigation, irrigation, drainage, and recreational development. Reports have been prepared for all of these basins, in coöperation with the Virginia State Planning Board and with technicians of the National Resources Committee in South Carolina. It is the intention of the National Resources Committee to summarize these reports in the form of a comprehensive nation-wide review of the needs of these basins. These studies have brought to light, more than ever, the need for more information and more data on water resources, which are in the ordinary scope of activities of this Division. In each of these reports recommendations were that studies of these subjects be made, either by the State or the Federal Government, or coöperatively by both. Each of these subjects has been recommended in almost every annual report of this Division, and the necessity for some attention to these matters grows ever more urgent. It is urgently recommended that the Legislature, in its next session, make adequate provision for the prosecution of these studies, and make available such sums as may be required for this purpose. These problems will be briefly presented as follows:

(1) Stream pollution by industrial wastes and municipal sewage is growing steadily to a point of crisis. There is at present not only no law adequately to control such pollution (except in the case of streams which may be desired for water supply), but no agency of the State government now has any authority or funds with which they may even investigate the present extent and character of the pollution problem. There should be set up at once, or as soon as possible, a branch of this Division whose duty it shall be to make a thorough State-wide survey of stream pollution, to determine the points of origin of the pollution, the amount and character of the polluting material, to determine suitable standards for maximum pollution, to recommend measures for control and methods of abatement of existing nuisances. This can be done in such a way as not to work a hardship upon any industry or any municipality, and would result in the tremendous betterment of the quality of our streams, increased fish life, and far more recreational use of our streams. This could not help being of great benefit to the people of the State. Every year the present condition is allowed to continue will make the final solution of this problem more difficult.

(2) Knowledge of the chemical qualities of both surface and ground waters is essential in the location of new industries in the State, where those industries are dependent upon water supplies of definite quality or water which must be converted or used in industrial processes. Frequent inquiries are received from persons interested in locating such industries, and the Division is embarrassed by the limited and inadequate data which are available. Not only is this true in regard to industries, but these data ought also to be on hand in connection with determining suitable supplies for municipal use. It would not require any very large sum to secure adequate data on the chemical quality of supplies, and this work could be done in connection with the pollution survey mentioned above. Provision must be made either under this project or under the project on stream

pollution, for laboratory analyses of the samples collected. It is recommended that a special laboratory equipped for this particular purpose be established, and that a technical staff and field force be engaged to undertake these two important studies.

(3) A review of the mapping situation in the State indicates the urgent necessity of completing the topographic map of the State, as provided for in coöperative arrangements with the U. S. Geological Survey. A little more than one-fourth of the State has been adequately mapped. Much of the area mapped in the western part of the State is now considered inadequate, and must be re-surveyed before proper maps can be prepared. The importance of this mapping program can not be overemphasized. The estimates indicate that, in order to complete the topographic map of the State, the sum of \$1,436,000.00 would be required to map that portion of the State now without topographic maps, and approximately \$282,000.00 for re-mapping areas as noted above. This does not include provision for mapping that portion of the State which lies within the Tennessee River basin. If this work is to be done in accordance with customary arrangements with the Geological Survey, it would have to be made on a dollar-for-dollar basis, and involve a contribution on the part of the State of North Carolina of approximately \$860,000.00. If this were spread over a period of some five to ten years, it could be easily accomplished, and would be of untold benefit for future development of the State.

(4) The drainage basin studies, referred to above, bring to light the fact that there are in the State now undeveloped water power sites with a developed capacity of 730,260 H. P. Even a cursory study of this situation discloses the tremendous need for further study of the whole power situation in North Carolina, if a proper provision is to be made for the orderly development of this important resource of the State. The studies also indicate that this problem can not be considered by the State alone, but should be done coöperatively for the entire region covered by the streams in Virginia, and North and South Carolina. This involves consideration of many factors, and would require a considerable period of time and a limited amount of field work. The importance of the study, however, will amply justify the expenditure coöperatively with adjoining States in a commission that would prepare adequate data covering this subject, upon which data for future power policy of the State could be determined.

The second main emphasis in connection with coöperation with the State Planning Board has been the preparation of a report on Resources and Industries of North Carolina. With money provided by special appropriation from the Emergency Fund, personnel has been engaged and it is expected to present a report early in December, 1936. This report will consist of an inventory of the resources of the State, and the industrial and social development which has taken place. Considerable attention will be paid to new opportunities for industrial development, as well as the possibilities of further development of industries. The Division of Water Resources and Engineering will devote its major attention to the preparation of this report.

The reports which the State Planning Board proposes to prepare for publication involve the third major interest of this Division, in that where the reports refer to water resources, power development, mapping, transportation, communication and other engineering phases of the State's develop-

ment, not only are the best records available for these studies to be found in the files of the Division, but also the best repository for new information and perhaps the best agency for future reference and contact is in this Division. It is therefore the intention of this Division to devote as much time as possible to these studies, availing ourselves of the opportunity for clerical, statistical, and research assistance provided through the Federal agencies coöperating with the State Planning Board.

The fourth major emphasis to which coöperation with the State Planning Board gives rise is in the actual administrative work involved, in the regular work of the Division, in the special work required for the report on Resources and Industry, and the operation of the Planning Board-Works Progress Administration project.

GEODETIC CONTROL SURVEYS

In the fall of the 1933, the U. S. Coast and Geodetic Survey completed its program for the fundamental control monumentation in the State of North Carolina. The work consisted of first order triangulation arcs at intervals of 100 miles, with the areas between them crossed by second order triangulation arcs at intervals of 50 miles. These, together with lines of precise traverses run along the S. A. L. Railway and parts of the A. C. L. Railway, in 1918, form a network of stations rigidly tied into the national geodetic net. The stations are marked by monuments consisting of bronze tablets set in concrete or rock, and so distributed that there is a monument within 25 miles of any point within the State.

The State Geodetic Control Surveys are supplementing this wider monumentation by running precise traverses along the highways and setting permanent monuments at two to five-mile intervals in order to furnish points accessible to engineers and surveyors in all localities. These are tied in to the fundamental net established by the Coast and Geodetic Survey. Each monument will have its position definitely located in the State by latitude and longitude and also by the state system of plane coördinates; the monuments will, therefore, furnish fixed points for tying in permanently highway, land, topographical, water, industrial, county and city surveys. Such surveys, when so tied in, can be correctly restored on the ground at any future time, and surveys made for one purpose can be used for other purposes, saving time and duplication of work. With this control, surveys of a large area can be started at a number of different points at once, and each will fit into its proper place on the map.

The supplementary Geodetic Control Surveys were begun in a small way, financed by Federal relief funds, in the spring of 1933. O. B. Bestor, directing engineer, has had charge of the surveys, and has done excellent work in this connection. On November 27, 1933, similar work was started throughout the United States under the supervision of the U. S. Coast and Geodetic Survey, financed by the Civil Works Administration, and continued until February 15, 1934. In this State an average of 130 engineers and assistants was employed, 415 miles of precise traverses were surveyed, and 72 pairs of monuments were placed. The work was then taken over by the State Emergency Relief Administration and carried on by that organization until the fall of 1935. An average of 125 engineers and assistants

was employed, 2978 miles of precise traverses were run, and 595 pairs of monuments were placed. In the latter part of November, 1935, funds were authorized by the Works Progress Administration for the continuance of the work under the sponsorship of the Department of Conservation and Development. During the period to June 30, 1936, there was an average of 185 employees engaged, 589 miles of additional precise traverses were run, and 119 pairs of monuments were placed. The work done under the three agencies totals 3982 miles of traverse and 786 pairs of monuments set, at a total cost of \$253,530.

Work has been done in 34 counties. Hyde County has been completed; Wake, Durham, Guilford and Forsyth Counties are more than half done. Substantial progress has been effected in Catwaba, Chatham, Duplin, Harnett, Johnston, Lee, Mecklenburg, Orange, Warren, and Wayne Counties, and surveys have been made in 19 other counties.

An office force is engaged in the computations of the traverses, and making descriptions of the locations of the monuments, so that they can be readily found. The descriptions include the geographic and plant coördinates of each state monument and the plane bearing between each pair of monuments, and furnish the permanent record of the monuments for public use.

The work begun in the latter part of November, 1935, was authorized by the Works Progress Administration under the sponsorship of the Department of Conservation and Development, and covered 589 miles of precise traverse and 119 pairs of monuments placed, at a cost of \$72,765. During the biennial period from July 1, 1934, to June 30, 1936, (which embraces the preceding period), 3017 miles of precise traverses were run and 603 pairs of monuments placed, at a cost of \$197,320.

Approximately \$31,000 have been approved by the WPA to carry the work of the existing personnel into the next fiscal year. The continuation of the program is entirely dependent upon funds furnished by the Works Progress Administration. Should the program be discontinued, an engineer and a computer would be required for about six months to complete the computations and permanent records. In order to make the geodetic control system effective and available to the public, it is desirable that a permanent office be established, employing at least one engineer experienced in the work and stenographic help to take care of correspondence. This office would maintain contact with engineers, surveyors, highway, railroad, city and county officials, industrial, real estate organizations, lawyers, and other agencies requiring surveys; and would collect data as well as give the information necessary to use the control. Such an office would find an appropriate location in the Division of Water Resources and Engineering.

PROPOSED PROGRAM OF WORK

It is proposed to continue the emphasis upon stream gaging survey activities under the same type of organization as now in effect.

Every effort will be made to bring up to date the map record of electric generating stations and transmission lines, not only for the State but also for surrounding areas.

In addition to the stream-gaging activities, the Division expects to continue operating evaporation stations on Lake Michie near Durham, and Narrows Lake near Badin. The latter is now in need of repairs if it is to be continued. It is proposed to continue coöperation with the U. S. Weather Bureau in the operation of certain river-gaging stations, and rainfall observations in Durham and Person Counties.

Special attention should be called here to the necessity for publishing a revised volume of stream flow records, giving publicity to the results of the stream-gaging activities. The last report on this subject was in Bulletin 34, published in 1923. It is proposed to revise those records and publish all records now available on all the stations in the State. To do this will require additional office staff and considerable office computation. Provision is made in the suggested budget for defraying expenses of publication. This publication would be the first tangible offering of data for public use on the record of flow of streams in the State, and it is hoped that this can be done early in the biennium.

It is proposed to continue the field studies on beach erosion in the summer of 1937, and each year thereafter. This erosion is steady and serious. Unless steps are taken to protect the beach at Fort Macon Point and at Fort Fisher, both of these valuable historical sites will be completely eroded away. No funds seem available at this time, but it is believed that it is highly important to continue the collection of data on this serious erosion problem, so that we may be prepared adequately to make proper recommendations when and if some such structures can be financed.

The Division will continue, as it has in the past, to furnish engineering service to the other divisions of the Department, and to other Departments of the State, as opportunity arises.

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